JUN 9 1898

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. JUNE 2, 1898. CHICAGO, ILL. NUMBER 22

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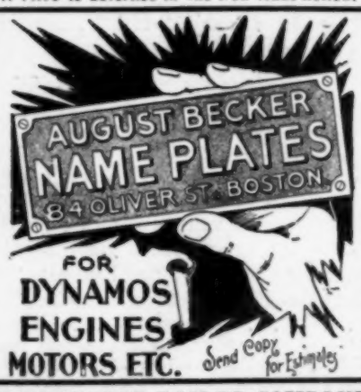

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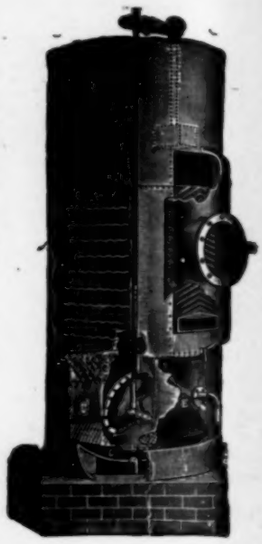

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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. JUNE 2, 1898. CHICAGO, ILL. NUMBER 22

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

There is no reason to change any of the statements made in the past three weeks concerning the strong position of the iron trade. The improvement referred to one week ago has been emphasized in the week ending to-day. While the immediate effect of the declaration of war was to check orders, and for a short time following nearly all mills produced more material than came on their books in new orders, this condition has been changed. Not a few mills have booked more business in the past two weeks than has gone off their books in shipments. The course of the money market since the war began has been closely paralleled in iron — hesitancy and some signs of stringency at first, but afterward a general relaxation and recovery of confidence, until to-day the feeling is better than at any time since the country made up its mind that war was inevitable. The splendid prosperity of the West has overflowed into other sections. Southern pig iron again goes freely into the Chicago district because it is needed, local producers having lost all their aggressiveness under the pressure of consumers to get their iron. And Central Western billets and finished material are going westward—a sharp contrast to conditions last year when thousands of tons of Chicago raw and finished products found their way into middle territory and even to Eastern points. A buying movement in Bessemer pig iron seems to be the one thing lacking to give the whole market an impulse to better prices. When third quarter wants of Central Western steel works come to be covered, as they soon must be, the successful maintenance of the $10 basis by furnaces is counted on to give stimulus to the whole market. Though soft spots have appeared in Southern iron, especially in Eastern markets, where Western New York, Virginia, Alabama and Eastern Pennsylvania furnaces have been close competitors, the leading Alabama companies are talking higher prices. Foundry furnaces the country over have not had so large a tonnage on their books at any time since the boom of 1895, and some have considerably exceeded the record made in that year. In the past week Detroit has been a large buyer, charcoal, high silicon and Southern coke irons being included in the orders. The movement for association of non-Bessemer pig iron producers makes progress, and another meeting of district representatives was held in New York on Friday. The last 5 or 10 per cent of tonnage brought into such an arrangement always takes as much time and effort as the first 75 per cent, and the final success of the present proposal depends on several still unsettled details. A significant thing in finished material is the placing of orders for wrought pipe, held up for some weeks until the effect of the war could be gauged. Agricultural implement works and railroads are going ahead with their buying as though no war existed, and locomotive works have had a remarkable run of foreign orders in the past two months, nearly 200 locomotives for foreign shipment being placed in that time.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
808 TRADESMEN'S BUILDING, June 1.

Steel bar requirements for agricultural implements have not been as heavy as reported in some quarters, but have been large, and have produced the only conspicuous orders in the last three weeks. An order of 7,000 tons, taken this week by Pittsburg, is next in size to the 25,000 ton contract mentioned last week. Buying in other lines is steady and all that the mills need. Sheet and tin bars are still scarce and very firm in price.

PIG IRON.—So far as current prices indicate, Bessemer iron is strong, with indications of increasing scarcity of iron in other than first hands. On June shipments nothing less than $9.75 valley furnace was reported during the week and $9.85 is said to have been paid. A disturbing feature, however, are the persistent reports of evasions of the $10 agreement, deals in coke, ore and basic iron being the reported means of juggling prices. Gray forge is again quiet, the present basis being $9 to $9.15, Pittsburg, and $8.80, valley. Quotations in Pittsburg are as follows:

Bessemer, valley	$ 9.75 to $ 10.00
Bessemer, Pittsburg	10.40 to 10.65
No. 1 Foundry	10.40 to 10.50
No. 2 Foundry	9.90 to 10.00
No. 3 Foundry	9.50 to 9.75
Gray Forge, valley	8.75 to 8.90
Gray Forge, Pittsburg	9.15

STEEL.—Prompt deliveries of sheet bars are hard to get. In some instances buying for immediate necessities has been forced upon mills unable to get shipments as requested. Tin bars are firm at $17, maker's mill. Billets at $14.75, maker's mill, and rods at $20.50, are weak.

BARS.—In addition to the 25,000-ton agricultural order of last week, another of 7,000 tons and one of 1,000 have since been taken. These were of better sizes and were taken by mills refusing to bid on earlier inquiries. The agricultural business in sight, while exaggerated in some statements, is very large and has stiffened prices slightly. Only very attractive orders can now secure any quotation below 95c. A week ago 90c and 92½c were frequently quoted. Common bar iron is selling at 95c, valley and branded all muck bar from 1.20c upwards.

STRUCTURAL MATERIAL.—Low prices are being made on angles by valley and western interests outside the pool and on small angles not covered by the agreement, pool interests are also selling low. Other shapes are not affected and mills are holding the pool schedule as follows: Beams and channels, 3 to 15 inches, 1.15c; 18 to 24 inches, 1.25c; tees, 1.20c, zees, 1.15c, and angles, 1.05c. Both local mills are getting orders enough for steady operation.

FERRO-MANGANESE.—The local producer quotes domestic ferro-manganese at $50 delivered at buyer's mill.

PIPES AND TUBES.—Two of the large line pipe orders tied up by the war have been placed. One is for 20 miles of 6- and 4-inch line pipe, and the other for 10 miles of 8-inch. Buying of merchant pipe is very small. The second discount quoted on merchant pipe is 6 tens and 2½ per cent on small lots. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. Discounts on merchant boiler tubes are as follows: 2¼ inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off. The buying is still confined to small sizes of pipe.

SHEETS.—Buying by the roofing interests is so far very

light, and although their buying season is well on. Under normal conditions the mills at this time would be rushed but as it is, few are busy. Specifications are withheld and new business is scant. Prices are still on a basis of 1.95c for No. 28. The largest local producer of galvanized sheets is well filled and in consequence galvanized sheets are firmer. We quote, 80 and 7½ per cent off list.

SPELTER.—Spelter is decidedly stronger, owing to its scarcity. Prime Western is quoted at $4.30 to $4 35.

PLATES.—Bids will likely be asked this week for the steel for the towers and shore spans of the East River bridge in New York, now that legal complications are removed. On a part of the work Pittsburg mills will bid Plate mills are more comfortably fixed just now than any others, and the 1.10c on tank is held firmly. Shell is quoted at 1.15c; flange, 1.20c to 1.25c, and fire-box, 2c and upwards.

SPIEGEL.—Spiegel is quoted at $23.50 and $24.

IRON AND STEEL SKELP.—A sale of 1,000 tons of sheared skelp is reported at $1.17½, Pittsburg—a high price on the present market. We quote: Grooved iron skelp, 1.05c to 1.07½c; sheared iron skelp, 1.12½c to 1.15c; grooved steel skelp, 97½c to 1c; sheared steel skelp, 1.05c to 1.07½c.

OLD MATERIAL.—Sales of the week include: 3,000 tons of old iron rails in the valley at $13.75; 1,000 tons of steel rails in Pittsburg at $10.25; wrought scrap at $10 50, net, in the valley; heavy melting stock at $10.50, gross; cast borings, $6, gross; wrought turnings at $7.50, gross; car wheels at $10.50, gross. Cast scrap has been off in price and sales are reported as low as $8.75 and $8.80, gross, in the valleys. In Pittsburg sales at $9 are reported. Other prices follow: No. 1 wrought, $11.50, net; charcoal, scrap, $10, gross; heavy melting stock, steel, $10.50, gross; billet and bloom ends, run of mill, $11; busheling scrap, $9.50, net; machine scrap, $9, gross.

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., June 1.

The fact that some further purchases of ores for shipment to Chicago have been made in the past week is significant as indicating that the enormous current production in that district will be kept up for months, first ore purchases being inadequate to take care of the business now counted on for the next twelve months. Outside of Mesabi ores it would appear that sales, both of Bessemer and non-Bessemer ores are now well up to the limit of probable shipments. The season of the year is approaching when a certain shifting percentage of mining labor on Lake Superior will leave the mines for the harvest fields of the Northwest and a reduced output in July, August and September is to be calculated upon, in making estimates of the ability of mines to get out ore. It is probable, when the present scarcity of labor at some properties is also considered, that there may be some falling off from the estimated output of certain old range Bessemer properties. Non-Bessemer ores, too, have been so well sold up in some instances that producers are not promising to fill late orders in full. Where the demand is exceeding the probable production, a small advance is now asked over early prices—say $2, instead of $1.90. Mesabi transactions have not been heavy in the week. The price is quite as low as buyers have expected, ranging from $2.15 to $2.25 for desirable ores, with a well authenticated quotation at $2.20 for an ore belonging to the first class. It is expected that Cuban and other imported ores will soon disappear entirely from the mixture of the seaboard plant that has thus far in the year used outside ores only. The drawback of 99 per cent of the ore duty can only be obtained on exported material made entirely from imported ores, so that there is ordinarily no mixing of outside and Lake Superior ores.

PIG IRON.—Valley furnaces adhere strictly to the $10 quotation on Bessemer iron, and some iron is reported sold on this basis for shipment to Pittsburg, making the delivered price $10.65 at Pittsburg steel works. This is the equivalent of a $10.40 basis, Allegheny county furnace, the freight being 25 cents. One Pittsburg interest has been a buyer of metal for some time, but thus far has been able to supply itself at from 10 to 25 cents below the agreed price. Another steel maker is now in the market for third quarter iron. In the present condition of the steel market, buyers of Bessemer are disposed to buy only in a hand to mouth way at the furnacemen's price. A Northern Ohio furnace not in the agreement, went out of blast last week and will remain out for repairs until late in July, adding just so much unexpected tonnage to the restrictive movement. The market for foundry iron has been well sustained, and the $9.50 furnace quotation on No. 2 is minimum. Some foundries are contracting as far ahead as furnaces will let them on the present basis. Lake Superior charcoal continues to be in good demand. We quote f. o. b. Cleveland:

Bessemer, second quarter	$10 65	Valley Scotch No. 1	$10 65@10 75
No. 1 Strong Foundry	10 65	Valley Scotch No. 2	10 25@10 40
No. 2 Strong Foundry	10 15@10 40	Gray Forge	9 25
No. 3 Foundry	9 65	Lake Superior Charcoal	11 50

FINISHED MATERIAL.—Electric railway business amounting to 1,300 tons of T-rails was closed the past week; and another rail order for 800 tons is pending. Bridge companies have been steady buyers of late and their specifications on old contracts have come in quite satisfactorily to the mills. In angles, the 1.05c Pittsburg price is maintained by pool mills, on all but smaller sizes, but on deliveries west of Pittsburg outside mills cut this price from $1 to $2 a ton. Plates are firm at 1.10c Pittsburg for tank, ¼ inch and heavier. Steel bars have gained some strength under the heavy demand from agricultural implement works and more mills are quoting 95c, Pittsburg, though this is shaded 50 cents a ton. Bar iron mills are busy and if substantially the scale of last year should be proposed by the men, the mid-year interruption will not be prolonged. The situation among local consumers of billets and tin plate bars is unchanged. The tin plate industries are operating to full capacity preparatory to the shut down. Rod and rail mills are not so well employed. The wire nail trade is not up to expectations. The agreed price of $1.30, Cleveland, is maintained, though some outside lots have been secured at a lower price. Smooth wire is still quoted at $1.15 and barb wire at $1.70 for four-point galvanized.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, June 1.

General market conditions have changed very little in the week. There have been no advances in prices, or changes of any kind, and the volume of sales keeps at about the same steady level in most lines of iron and steel products. The pig iron market has been quiet, with rather smaller sales than in preceding weeks. The steel market is active. The local mills and furnaces are all full of orders for from three to six months ahead, and the demand for material appears to be fully as large as it was three or four weeks ago. The Illinois Steel Co. last week refused orders for rails which were offered for delivery within the next three months, being unable to fill them within the required time. The plate mill has orders to run it for six months, with an ordinary run of small orders from week to week. The billet and rod mills will be occupied on present orders well into the summer. The bar mills have recently secured large orders, and with the business that is expected to come in within the next three weeks will be in excellent shape to go through the usual summer dullness without taking more business. The furnaces running on foundry iron in this district have about all they can do to fill orders on the books, and will want very little more business for delivery this year. Locally the situation is fully as strong as at any time this year, and in some lines the possibility of an advance is not remote. Consumers of the various forms of material made in this district are all busy, and are taking their shipments as fast as possible. In many cases they are anxious to anticipate their contracts, and would do so if the producers were able to make shipments faster.

PIG IRON.—Owing partly to the sold-up condition of the local furnaces, and partly to the higher prices they are asking, Southern furnaces are securing the bulk of the business that is being placed. It is estimated that sales of Southern iron last week aggregated fully 6,000 tons, running in size from 1,000 ton lots down to carloads. There is still a good inquiry in the market, and sales are expected to continue fair for the next few weeks. The foundries in this district are nearly all running full, and are using more iron than ever before. The agricultural implement manufacturers—the largest consumers here—are taking fully 25 per cent more than in any previous year. Prices remain unchanged, but Southern irons are stronger than they have been lately, and

some talk is heard of advances. It is said, and probably with truth, that the recent large sales of Southern irons to implement makers were made at something under the association prices, the furnaces in the association having agreed to make reductions especially for these trades. Quotations follow:

Lake Sup. Charcoal	$11 50@13 00	South'n Coke No. 1	$10 10@10 35
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	10 60@10 85
Local Coke Fdy. No. 2	11 00@11 50	Southern No. 2 Soft	10 35@10 60
Local Coke Fdy. No. 3	10 75@11 00	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 75@11 00	Alabama Car Wheel	14 00@16 00
South'n Coke No. 1	10 60@10 85	Malleable Bessemer	11 50@12 00
South'n Coke No. 2	10 35@10 60	Coke Bessemer	11 50@12 00

BARS.—Several large season contracts were placed last week by agricultural implement makers, the total sales of this character probably aggregating over 20,000 tons. The larger buyers have nearly all placed their orders now, but a number of the smaller concerns have not yet contracted and these are expected to do so within the next three weeks. Some of the large contracts recently placed were at very low prices—considerably under those we quote. It is reported that one contract went at 95 cents, delivered, Chicago. Sales of smaller lots have been made at full prices, and the fact that the larger buyers have placed their orders, taking so much mill tonnage out of the market, is a feature of strength. Some mills are refusing to sell at the bottom quotation now, but are holding for the higher prices which they are confident will come soon. General business in small lots is fair. Quotations are unchanged: Common iron is quoted at 1.05c to 1.10c; guaranteed, 1.10c to 1.15c; soft steel bars, 1.15c to 1.20c.

RAILS AND TRACK SUPPLIES.—Local mills have their order books too well filled to take business for anything like nearby delivery, and several orders for summer delivery have been refused. The market is strong, and prices are unchanged. Quotations are as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.15c to 1.25c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.50c to 1.60c.

BILLETS AND RODS.—There were no sales of either billets or rods last week, in this market. Prices are unchanged at $16 to $16.50 for billets and $22.25 to $22.75 for rods.

CAR ORDERS.—The Rock Island road has given an order for 500 cars to the Michigan-Peninsular Car Co. The sales of car material in the week included several good orders.

STRUCTURAL MATERIAL.—The contract for the By-pass, on the Drainage Canal, taking about 1,500 tons of material, will be let early in June. One of the large dry goods houses is figuring on putting up a large building soon, to cost $1,000,000. The concern has secured ground leases, and it is thought will go ahead with the work very soon. General business in small lots has been quite good, and the demand is excellent. Quotations are as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.20c to 1.25c; plates, 1.15c to 1.20c; tees, 1.35c to 1.40c. Small lots from stock are quoted at ¼ to ½ cent higher.

PLATES.—Sales of plates in the week included no noteworthy orders. The local mills are very busy on old contracts, and can accept very little business for anything like early delivery. The market is firm at the prices quoted. Prices are made as follows: Tank steel, 1.15c to 1.20c; flange steel, 1.20c to 1.40c; fire box steel, 1.85c to 5c.

SHEETS.—Both black and galvanized sheets have been in good request, and sales were fully as large as those of the week previous. Inquiries in hand denote a continuance of the good business. Quotations are made at 2c to 2.10c for No. 27, black, and 80 and 10 per cent discount for galvanized.

SCRAP.—There is some demand from the East, but very little locally. Sales have been small, and are not expected to show great improvement immediately, particularly in rolling mill material. Dealers' selling prices are as follows:

Old iron rails, gross	$12 25@$12 50	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@11 00	Cast borings, net	4 25@4 50
Old steel rails, short	8 75@9 00	Wrought turnings, net	6 00@6 50
Old wheels, gross	11 00@11 50	Axle turnings, net	7 00@7 25
Railroad forge, net	11 50@12 00	Mixed steel, gross	7 25@7 50
Dealer's forge, net	10 00@10 50	Stove plates, net	5 75@6 00
No. 1 mill, net	7 50@8 00	Heavy melting steel, gr.	8 25@8 50
Heavy cast, net	8 50@9 00	Old iron splice b., net.	12 75@13 00
Malleable cast, net	8 00@8 50		

MERCHANT STEEL.—Implement makers placed several contracts for season's supplies last week, and general business was good. The mills are holding off as much as possible, and are anxious to obtain higher prices. Prices follow: Open-hearth spring, tire and machinery steel, 1.60c to 1.70c; smooth-finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.50c to 1.60c; tool steel, 5.50c to 7.50c; specials 11c and upwards

CINCINNATI.

May 31.

Producers and sellers of Southern iron have been interested in the pig iron contracts placed by Detroit concerns the past week. The orders were for several thousand tons of Lake Superior charcoal, high silicon and Southern coke brands. The general run of business in central territory was in small orders. Though there is quietness at this writing, some important deals are pending and some sharp competition between Northern and Southern irons is expected. There is here and there a soft spot in Southern iron, but the general situation is strong. There is a growing tendency to firmness in the views of the leading producers and one or two companies, better booked probably, than they have ever been, are talking of advancing quotations, believing that consumption is sufficient to take up all iron likely to be produced at present prices. We continue to quote f. o. b. Cincinnati: Southern coke, No. 1 foundry, $9.75; No. 2, $9.50; No. 3, $9.25; gray forge, $8.75; mottled, $8.75; No. 1 soft, $9.75 to $10; No. 2, $9.50 to $9.75; Belfont coke, No. 1, Lake Superior, $11 to $11.50; Belfont coke, No. 2, Lake Superior, $10.50 to $10.75; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; Standard Georgia car wheel, $14.25 to $15.

BUFFALO.

May 31.

Quite a buying movement has been seen in this market in the past week, chiefly from the larger consumers, such as the agricultural implement manufacturers, the pipe works and the malleable iron works. The tonnage booked has been something beyond the ordinary. One large concern that a short time ago thought it had sufficient purchased to run through the year has been compelled to come into the market again for considerably more iron. With several orders in the same line of work, it has received heavy foreign orders, compelling it to run further into the summer than ever. The growing scarcity of scrap has compelled several of the larger consumers of this material to purchase pig iron for use in its place. The heavy tonnage recently booked by some has caused a firmer feeling and there is better prospect of an advance in the most popular brands of foundry iron. We quote f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $11 to $11.25; No. 2, $10.50 to $10.75; Ohio strong softener No. 1, $11.50 to $11.75; No. 2, $11 to $11.25; Jackson Co. silvery No. 1 $14; Southern soft, No. 1, $11.50 to $11.75; No. 2, $11.15 to $11.35; Lake Superior charcoal, $11.50.

Heavy Export Orders for Locomotives.

The order just received by the Baldwin Locomotive Works for 77 locomotives for the Trans-Siberian and Chinese Eastern Railroad emphasizes the large proportions of the recent foreign demand upon the locomotive works of the United States. In all the Baldwin works have taken export orders for 107 locomotives since April 1. The New York *Commercial Bulletin* figures that with this latest Philadelphia order and that just taken by the Richmond Locomotive & Machine Works, for 17 compound locomotives for the Finland State Railroad, 172 locomotives have been ordered for export since April 1. It is stated also, that a number of important contracts are under negotiation, particularly for Russia and Mexico.

THE Wabash car shops at Toledo, O, have been running quite full of late, and in some departments over-time. Facilities have been considerably increased in the past year.

THERE is no change in the strike of Cleveland core-makers for an advance from $2.25 to $2.50 a day. Foundries are sending large cored work out of the city and for the most part are strenuously resisting the demand of the men. In a few instances the advance was granted. The molders are taking no hand in the contest. New core makers will be introduced in some of the foundries, if the strike continues.

THE IRON TRADE REVIEW

AND

INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

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ORE STOCKS AT LAKE ERIE DOCKS.

Statistics of iron ore on dock at Lake Erie ports seem to possess no significance, as far as general trade interests are concerned. They are probably of value to owners of docks, vesselmen and managers of railroad lines running to blast furnaces, but apparently too many elements have to be taken into consideration by buyers of iron ore and those engaged in manufacturing and working up iron and steel to enable them to draw any useful inference from the figures put forth. It is stated, for instance, that the stocks of iron ore at all Lake Erie docks May 1, amounted to 3,167,615 gross tons, against 3,256,497 tons on May 1, 1897. Thus the quantity on dock this year at the opening of lake navigation was but a trifle below that of last year. Yet the greatest activity has ruled at all the workable blast furnaces plants in the Central West since the close of navigation last fall, as compared with the depressing degree of inactivity during the previous winter. The belief was quite general last fall that the pronounced improvement in the iron trade would cause such an increase in shipments from the docks during the winter that they would be practically bare this spring. An examination of the figures, however, discloses the somewhat singular fact that in the winter just ended the shipments from the docks to furnaces were but little over 1,000,000 tons in excess of the shipments in the winter of 1896-97, and barely 300,000 tons more than in the winter of 1895-96. In the last named period, it will also be remembered, the production of pig iron shrank from month to month, while in 1897-98 the production ran far in excess of the best month of 1895-96 and kept up to high water mark persistently. The great stocks on dock at the beginning of the present month, therefore, seem to prove nothing to the iron tradegenerally, except that the storage at the docks and at blast furnaces has been greatly increased. They certainly do not indicate that the pig iron interests are lacking in activity as they were at the corresponding time last year. Perhaps the statistics may be taken to indicate that the iron trade has no reason hereafter to feel alarm over reports in circulation at the close of navigation of a famine in ore by the time shipments from the mines are resumed.—[Iron Age.

Statistics of iron ore stocks on Lake Erie docks are only significant when taken in connection with other statistics relative to the movement of Lake Superior ores. It signifies little to say that there was on docks May 1, 1898, 3,167,915 tons, as against 3,256,479 tons May 1, 1897, unless there is also given the movement of ore over the docks during the season of navigation included in the twelve months preceding May 1. It is quite essential to know the dock stock every spring in order that the missing factor, i.e., the winter shipments, may be supplied for the calculation of the year's total. When the shipments from docks to furnaces in the winter of 1897-8 are added to the shipments over the docks in the season from May 1 to Dec. 1, 1897, the very significant total of 10,209,488 tons is obtained, this being 3,500,000 tons more than in the twelve months ending May 1, 1897, and 1,400,000 tons more than in the twelve months ending May 1, 1896. The totals for the 12-month periods, it will be seen, are in very close correspondence with pig iron production in the respective years.

There are careless and ill-informed writers concerning the iron ore trade, as on other departments of the iron trade. No one in the ore trade whose utterances are regarded as authoritative, counted on bare docks in the spring of 1898. Such a prediction involved an apparent consumption of 13,377,403 tons of Lake Superior ores in the year ending May 1, 1898, by furnaces tributary to Lake Erie docks, whereas 8,805,510 tons was the largest previous record—that being in the boom year 1895 and the winter following. No one connected with the trade would have had the hardihood to expect winter shipments of 5,923,755 tons, after the unparalleled total of 7,453,648 tons in the last season of navigation. Yet some trade writers made this very prediction.

It is well known that the furnaces have greatly increased their storage room in the past few years, so that they might take forward as much ore as possible in the navigation season. Loading from vessel directly into cars means a saving of 7 cents a ton, a very distinct advantage on to-day's basis. Moreover, furnacemen have been learning—some of them finding it out sooner than others—the money value of ore shipments in the summer season, when the freight on moisture is reduced to the minimum and the ore is more economically handled than when frozen. The aim of the railroads, with their tempting rebate, has been to concentrate the ore movement in the months of the year when coal is going in large quantities to the lake, so that the large number of cars engaged in the mineral traffic in those months may be loaded going and coming. Naturally the roads would reduce to a minimum the number of winter trains which go to the furnace yards full of ore and for the most part return empty.

With the tendency that appears in other features of the Lake Superior ore trade toward stability, instead of the fluctuation of other years, it may be expected that dock statistics will show a greater approach to uniformity in the future. As the consumption of Lake Superior ores grows, it will not be surprising to see a considerable dock stock carried the year round, as a balance wheel to the trade—a guarantee against such a scarcity as might result from a general strike at the mines, for example, or any interruption in the movement of ore from upper lakes.

How the practice of taking forward ore to furnace yards in the navigation season has grown in recent years appears from a movement of 7,453,648 tons from docks to furnaces in the season of 1897; 5,021,146 tons in 1896; 6,339,496 tons in 1895; 4,105,948 tons in 1894; 3,358,148 tons in 1893; 4,048,471 tons in 1892; 3,831,195 tons in 1891, and 3,917,405 tons in 1890.

THE increase in the production of open-hearth steel in the United States last year over 1896, as shown by the statistics printed elsewhere, is more than 25 per cent—1,631,843 gross tons against 1,298,700 tons. The increase in basic steel is nearly 40 per cent. The production of Bessemer and open-hearth steel in the past four years is shown below in gross tons:

	1894.	1895.	1896.	1897.
Bessemer	3,571,313	4,909,128	3,919,906	5,475,315
Open-hearth	784,936	1,137,182	1,298,700	1,631,843
Total	4,356,249	6,046,310	5,218,606	7,107,158

It will be seen that the total steel production of the country was nearly 40 per cent greater last year than in 1896. The impetus given to the building of basic open-hearth plants by the high price of Bessemer ores and the billet pool in 1896 made its impress upon the statistics of production last year. Yet the tendency that appeared in 1895 and 1896—and commented upon not a little at the time—indicating that the growth of open-hearth steel capacity would be at the expense of Bessemer steel, is not borne out by the figures. Indeed, the percentage increase of basic open-hearth in 1897 over 1896—40 per cent—is almost identical with the increase in Bessemer steel. The growth of the export trade, the expansion of the demand for steel in place of iron, and the revival of all domestic industries after the four years of depression, are factors in the account. It may be urged that 1897, with its remarkable rail production following the breaking of the pool, does not fairly show the relative position of Bessemer and open-hearth steel in structural and other finished lines. Granting this, there is no predicting that 1898 will not make a similar record. At all events, the growth of open-hearth steel production is not, thus far, through the displacement of Bessemer; and the realization of Holley's prediction that the open-hearth furnace would yet attend the funeral of the converter is still some distance in the future.

THE patriotic impulses which have found expression in the raising of flags at furnace and steel works plants, are a protest to the effort that has been made with such persistence to array workingmen against the military arm of the Government. The Monongahela valley, teeming with industrial life, has been in the past few weeks, ablaze with fluttering flags. Times have changed since the summer of 1892 when the same flag was fired on, as it was borne by armed forces of the State, called out to suppress rioting by strikers. The war will have many compensations, and one of them will be the quickening of regard for our common country and the sinking of bickerings over wrongs real and fancied, in gratitude for the protection afforded in free America against oppression such as that which has called a great nation to the help of suffering Cuba. The reckless agitator has been amazingly persuasive, to judge from the success he has had in inducing labor to assume an attitude of antagonism to the most just and the most benignent government on the face of the earth. Perhaps the lesson of respect for our institutions and of unswerving loyalty to their authority will be well learned in the present struggle, even though it be at the cost of blood and treasure.

FOUNDRYMEN AT CINCINNATI.

Handsomely engraved announcements of the convention of the American Foundrymen's Association at Cincinnati, on Tuesday, Wednesday, Thursday and Friday of next week, have been issued by the local committee. Preparations are being made which indicate that both the social and technical features of the gathering will be thoroughly successful. Present indications are that the attendance will exceed considerably that at the Detroit meeting of last year.

There is no formal program for Tuesday, that day being given up to registration and visiting points of interest. The defense movement started at New York some months ago may also receive attention. The convention will be called to order at 10 A. M., Wednesday, by President Francis Schumann, of Philadelphia. There will be addresses of welcome by D. McLaren, president of the Addyston Pipe & Steel Co., on behalf of local foundrymen, by Mayor Tafel, representing the city, and by W. B. Melish, on behalf of the Cincinnati League. The local reception committee will speak through Lazard Kahn, of Hamilton, O., and the local entertainment committee through D. B. Meacham. Response will be made by President Schumann. An address will be made also by James Bowron, vice-president of the Tennessee Coal, Iron & Railroad Co. Reports of officers and committees will occupy the remainder of the morning session. The program for the other sessions of the convention is as follows:

Wednesday Afternoon.

A paper "The Molder of the Future and the Need of an Adequate Apprenticeship System," by P. W. Gates. Discussion.

A paper "The Adoption of a Standard System of Test Bars for Cast Iron," by R. G. G. Moldenke, E. M., Ph. D. Discussion.

A paper "A Talk on Brass Founding," will be read by Chas. Vickers. Discussion.

"A Test for Determining the Hardness of Cast Iron," by C. A. Bauer. Discussion.

A paper "Manganese in Cast Iron," by Guy R. Johnson. Discussion.

Wednesday Evening.

The delegates and their friends will be entertained at a smoker by the local entertainment committee in the Grand Hotel.

Thursday.

The entire convention will be guests of the Addyston Pipe & Steel Co., and the local entertainment committee. At 10 A. M., delegates will go on board the large three-deck excursion steamboat, Island Queen, and proceed down the Ohio River to the Addyston plant, where opportunity will be given to inspect this large foundry, that has a capacity of 375 tons per day. The boat will reach the city upon the return journey at 4 P. M.

Thursday Evening.

A paper "Inspection of Castings," by E. H. Putnam. Discussion.

A paper by S. S. Knight, "The Micro Construction of Iron and Steel." Stereopticon. Discussion.

Friday Morning.

A paper "Trolley Systems, Their Value and Cost," by H. M. Ramp. Discussion.

"Necessity of Well Mixed Furnace Casts and True Reports of Analysis," by Thos. D. West. Discussion.

"The Manufacture of Steel Castings," by Stewart Johnston. Discussion.

Friday Afternoon.

"Notes on the Tropenas Steel Process," by Alexander Tropenas. Discussion.

"Incombustible vs. Combustible Foundry Buildings, having Special Reference to their Strength, Durability, Economy and Cost," by O. Benson, C. E. Discussion.

Unfinished business.

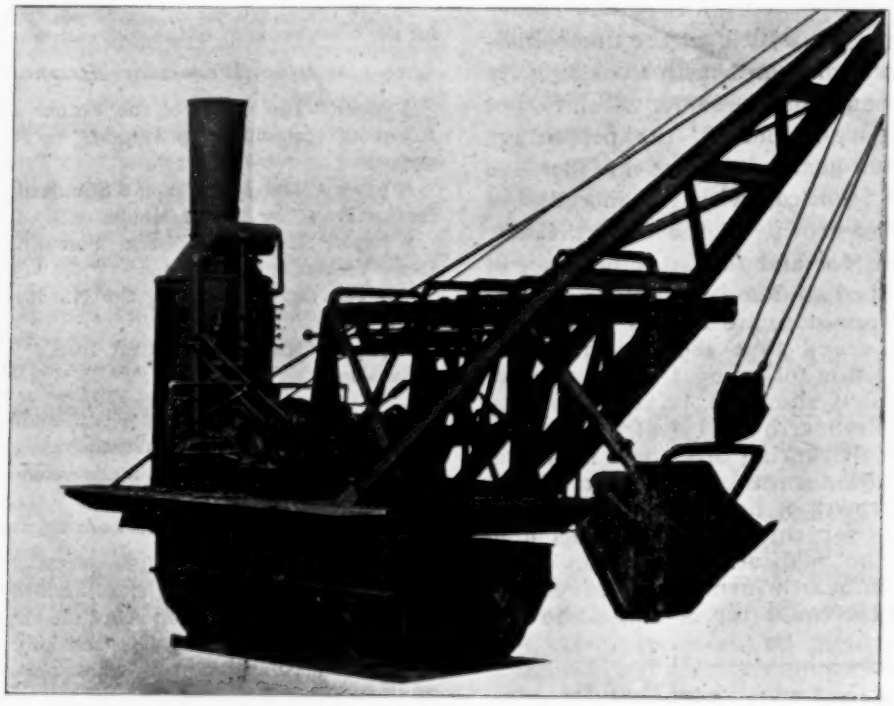
Election of officers.

The Grand Hotel has been selected as the association headquarters and the meetings will be held in the convention hall of the hotel. Arrangements have been made for a two-thirds railroad rate on the certificate plan.

THE THEW STEAM SHOVEL.

In connection with the article in our issue of March 31 describing the Pittsburg, Bessemer & Lake Erie Railroad terminals and dock facilities at Conneaut, O., a view was given of a Thew automatic steam shovel loading ore from dock stockpiles into cars. We give herewith an illustration of the shovel itself, showing to better advantage its construction and method of operating. The designer and patentee of the shovel is Richard Thew, and it is manufactured by the Thew Automatic Shoveling Co., of Cleveland. Though primarily designed for loading ore from dock stockpiles into cars or from furnace-yard stockpiles into barrows, the Thew shovel is built adaptable to all the range of service expected of machines of this class.

As the illustration shows, the shovel rests on a four-wheeled truck, and the scoop together with the boom and operating machinery, boiler, etc., is so mounted that it may be swung and operated throughout a complete circle and with entire safety, the truck frame being well braced at each side. The wheel base is 9 feet, center to center. The gauge is 4 feet 8½ inches and wheels and axles are of heaviest standard railway pattern. Rubber buffers inserted above the axle bearings absorb vibration and shock. A circular racking gear of 7 feet diameter, large pitch and wide face is mounted on the truck frame and securely fastened to it. A ball path in the upper face of this gear contains a train of hardened steel balls which carry the upper rotating table. The latter is centered and confined to the truck frame by a heavy cast steel journal.



THE THEW STEAM SHOVEL.

The operating machinery consists of a double hoisting engine mounted on a heavy cast iron frame, which frame also carries four independent shafts. Each of these shafts is driven by a set of steel gear wheels and is thrown in and out of motion by means of friction clutches. The boiler is upright; carries 100 lbs. of steam and is rated at 40 h. p. The engine and boiler are carried by a substantial frame built up of rolled shapes and the boom, fixed to the forward end, is stationary.

The feature of the Thew shovel is the mechanism by which the scoop is given two independent movements: One, the radial hoisting movement, common to all steam shovels; the other, a horizontal motion parallel to the track on which the machine stands. This second motion gives the shovel a wonderful efficiency. The horizontal motion at the time of hoisting places the scoop in a specially advantageous position for filling; this motion also makes it possible to clean up material completely, as the scoop, if need be, can be made to traverse the floor of the stockpile in a horizontal plane, and gather up all that is upon it. The horizontal movement serves a valuable purpose in discharging the load. An instantaneous increase or decrease of scoop radius, measured from the center of the machine, makes it possible so to empty the scoop contents as to trim the load in the car or other receptacle, and this at any point in a complete circle.

The mechanism for securing the two movements named is thus described: About six feet from the floor of the car a track is arranged, carrying a sliding trolley which is propelled horizontally through a distance of about six feet. This trolley carries the upper end of the scoop arm, which is pivoted thereto by means of a heavy steel pin. The scoop arm is made in two sections, which are telescopic, and the length can be adjusted to suit varying requirements. The upper end of the boom is provided with heavy turned sheaves, over which passes a cable running through a corresponding sheave on the bale of the scoop. All hoisting movements of the scoop are obtained by means of the cable, one end of which terminates on a winding drum which forms a portion of the operating machinery referred to. Parallel movements of the scoop are given by means of a screw which propels the trolley backwards and forwards. This screw has a pitch of about three inches, and is driven by means of a heavy bronze nut which is carried in substantial bearings and revolved by the hoisting engine through the medium of bevel gears and sprocket wheels. The machine is operated through the medium of three levers, one of which controls the hoisting cable, the second the trolley screw, and the third the rotating gear. By means of these levers the scoop can be raised and lowered or thrust in and out through a distance of six feet, and the entire machine can be revolved and operated in either direction throughout a complete circle.

For propelling the apparatus along the track, a sprocket wheel is mounted on each axle and driven by heavy steel chains from the hoisting engine mechanism. This secures a speed of 200 feet a minute. A winch attachment to the engine is a medium for shifting cars as they are required. By it four loaded cars of 100,000 pounds capacity each can be moved.

The swinging of the machine through a complete circle makes it effective over a wide area, without change of base; and by means of a portable switch cars can be delivered to it convenient for loading, with little or no change of the position of the shovel, while a large stockpile is cleaned up. The advantage of the horizontal movement of the scoop, in dock work, is that a level surface is left by the shovel and no hand labor is required to follow it. The parallel movement also permits of cutting a sufficient distance ahead to lay a 9-ft. rail in front of the wheels. The winder head may readily be swung to the proper position for shifting cars, without respect to their location relative to the machine. The horizontal movement of the scoop is of special service where obstruc-

tions are met. The scoop can be driven directly under the obstruction to lift it out, or it may be withdrawn and forced in over the obstruction.

The speed with which material is handled is indicated in records as high as 200 tons an hour. In regular service the shovels have handled from 1,200 to 1,500 tons in a day of 10 hours, besides shifting cars. The machine is operated by two men, one handling the operating levers, while the other trips the bucket, handles the rope in shifting cars, and aids in bringing the machine up to its work. The operator has ample time to fire the boiler as cars are being shifted. The shovel is made in three sizes, No. 1 weighing 18 tons, No. 2, 25 tons, and No. 3, 30 tons.

In the rearrangement of blast furnace stockyards and the installation of the bin system, the Thew shovel is being figured on in a number of instances. In such cases, cars loaded from furnace stockpiles with the shovel are run upon trestles and the ore dropped into bins. Thence, as needed, it is run into bucket-cars or barrows to be hoisted to the top of the stack.

Personal.

David J. Jenkins, chief electrician of the Pennsylvania Steel Works, has been assigned as assistant engineer on the Amphitrite, of Admiral Sampson's fleet.

Prince Albert of Belgium, who is traveling in this country incognito, visited the plants of the Pittsburg district last week. He was the guest of George Westinghouse, Jr.

William McConway, president of the McConway & Torley Co., of Pittsburg, sails this week with his family for a tour of England, Ireland and Scotland.

Joseph Hilton has taken charge as manager of the new eight-mill tin plate plant of the Laughlin Nail Co., at Martin's Ferry, O. The new plant, which is now ready for operation, is one of the most complete of its kind in the country.

A pleasant feature of the convention of the Amalgamated Association, at Cincinnati, was the presentation of a silver tea service and a diamond stud to ex-President M. M. Garland, now surveyor of the port of Pittsburg. The presentation speech was made by President Shaffer.

C. A. Clarke, of Hill, Clarke & Co.; the well known machinery manufacturers, of Boston and Chicago, returned to the United States this week after a European tour which included a number of the machinery markets on the other side.

Hon. B. F. Jones, of Jones & Laughlins, Ltd., returned to Pittsburg this week after a two months' stay in Europe.

Jeremiah Head, well known as a metallurgical engineer, and as the managing representative of the English holders in the Otis Steel Co., landed last week from London and will remain for a short time arranging for further improvements at the Otis plant. A. P. Head accompanies him and has part in the work.

Lake Superior Iron Mines.

The Newport Mining Co., Ironwood, Mich., has been advertising for 50 miners for underground work. The scarcity of labor is beginning to be felt on the Gogebic and Menominee ranges.

In connection with the filing of the transfer of the lease of the Sellers mine to the Lake Superior Consolidated Iron Mines, a modification of the original lease is made. The royalty is changed from 35 to 25 cents and the ground rent from $7,000 to $12,000. It is stipulated that the royalty may replace the ground rent when it reaches the amount of the latter in any year.

The Swanzey mine, at Negaunee, now controlled by Tod, Stambaugh & Co., will be known hereafter as the Princeton.

The annual meeting of the Minnesota Iron Co. occurs this week. The quarterly dividend of 1½ per cent will be declared.

Minnesota's board of railroad and warehouse commissioners is urged to appoint an early day for the hearing of the complaint against the iron ore rate on the railroads of the State. Counsel for the roads ask for two months to prepare an answer.

THE Brewer Steel Tubing Co., Toledo, is reported to have disposed of its plant and business to the Shelby Steel Tube Co. The plant has been idle for some time, the compay having been practically a part of the combine for some time.

A STANDARD METHOD FOR ENGINE TESTS.*

BY GEORGE H. BARRUS.

The action of the society in the past in devising standard methods of tests in various lines of engineering is well known to the members, and it is believed that the work thus far done has been creditable to the organization, and has given the Society a position in the engineering world which it would not have occupied if it had followed a different policy. In the steam engineering line we now have a standard of boiler testing (Atlantic City meeting, 1885), a standard method of conducting duty trials of pumping engines (Richmond meeting, Nov., 1890), and standard methods of testing locomotives (Chicago meeting, Aug., 1893); but we have thus far no standard which applies to the general subject of engine testing. Having done so much in making uniform the various methods of tests in steam engineering, it is evident that further standardizing should be undertaken, so that the whole subject may be covered. It seems to me that the time has come when the society should take up this matter and appoint a committee for devising a standard method of making engine tests in general. Its work in this line will then be no longer incomplete.

The present need of a standard method of testing engines is perhaps less urgent than that of testing boilers, pumping engines, and locomotives, which have received attention at the hands of the society; but the same general reasons may be advanced in its favor as those which may be found in the reports of the various committees; that is, to bring the methods of testing employed by different experimenters into harmony with each other, and to inaugurate a standard method of reporting the results of engine tests and of expressing engine efficiency.

The determination of a standard method of testing engines in general would naturally precede the determination of methods of testing individual types of engines; or, if it did not precede such work (as, in the case under consideration, it cannot), it should be so far in harmony with the individual methods that there might be no interference. So far as the working of steam in the cylinder is concerned, one type of engine is very much like another, whether its force is expended in turning a shaft for generating power to drive a mill or other mechanism, or to pump water, or haul a train of cars; and the operations of determining the efficiency with which the steam performs its work are much the same in one as in another. Looking at the subject from this single point of view, it is a late day to be advocating a standard method of general engine testing, for it should preferably have been taken up prior to the work done by the committees on duty trials and locomotive testing. Nevertheless, the work is something which I have long thought should be undertaken; and if, owing to the exigencies of the times, the best order has not been followed, it is not too late to correct the error, if such it be.

I am inclined to the belief that it would be well now for the society not only to prepare a standard of general engine testing, as suggested, but, at the same time, to revise the work of the two committees on duty trials and locomotive tests, insofar as should be done to bring all three into harmony; and then combine the whole subject of engine testing, whether it be on one type of engine or another, into a single report. There is so much in common amongst steam engines used for different classes of work, that there ought to be little difficulty in devising a standard of testing and reporting efficiency, which would be applicable to all, whether employed in pumping water, hauling trains, operating electric generators, propelling ships, or driving any other kind of mechanism; and, furthermore, there ought to be no difficulty in modifying such a standard so as to make it applicable to the peculiar conditions of service required in any individual case. If a revision of the work of the two committees referred to should be undertaken, I would not advise changes in the substance of their recommendations; for these, so far as I know, are acceptable to the society. What I do suggest, is that the whole matter of engine testing be brought into one uniform system, with suitable modifications adapting it to individual requirements; and publish the report or code, whatever it may be

* Read at the Niagara Falls meeting of the American Society of Mechanical Engineers June 1, 1898.

called, in one comprehensive document. If this were done, the society would have simply two standard systems of making steam-power tests; one relating to boilers, which, at the date of writing, is about to be submitted in the form revised by the committee of 1895 for the consideration of the society, and the other relating to engines. The subject of steam-plant tests would then be in such shape as to be most convenient for the use of members and others interested, and it would be of increased value to colleges, who, as I understand, regard the society's reports as valuable standards of reference in the instruction of students.

Suggestions as to a Standard System of Testing Engines.

The principal data required for an efficiency test of a steam engine are the weight of steam consumed and the amount of power developed. These two elements of data are fundamental whatever the type of engine, and whatever the class of work performed. It is evident at the outset that a system of engine testing applicable to all engines would be a method of determining these quantities. Consequently, the proposed standard would relate primarily to these two things and to the expressions of efficiency derived therefrom.

If, for the moment, we pass by the steps required to obtain the necessary data, and take up the problem of bringing into uniformity the methods of reporting the results obtained from different classes of engines, the subject arranges itself in a simple manner. The desired uniformity will be secured if the tabular summary of results is expressed in two sections; the first section dealing with such data as apply to the working of the steam in the cylinders, apart from the peculiarities of the service which the engine performs, and the second section giving the data and results pertaining to the special individual work. Following out this scheme more in detail, the first section of the tabular report would contain all the data of measurements of feed water, of steam used by the jackets and re-heaters, if these were employed, the quality of the steam, the weight of steam used by the auxiliary apparatus, and all the data of the various pressures, temperatures and speed relating to the work of the engine, including the pressures and other data obtained from the indicator cards. It would give the horse-powers developed, the weight of steam consumed by the engine and by the auxiliaries in a unit of time per unit of power, the deductions from an analysis of the indicator diagrams, and the total number of heat units consumed in a unit of time per unit of power. It would also present the standard decided upon for the expression of efficiency.

The second section of the tabular report would vary with each class of engine. In this section, there might be five sub-divisions, one applying to each main class of engines.

The classes which suggest themselvse to me are as follows:

1. Factory engines, or engines employed in the production of power in general.
2. Pumping engines.
3. Locomotives, (*a*) shop tests, (*b*) road tests.
4. Engines employed in generating electricity.
5. Marine engines.

In the first sub-division of the second section, that relating to engines for general work, few additional data need be given, beyond those found in the first section. Engines in general are employed in generating power for such a variety of mechanical operations, that the simple expression of efficiency, based on the quantity of heat or steam used per gross or net horse-power per unit of time, covers essentially the whole ground. This section might, however, present the data and results of a coal test of the engine, where this was made; in which case, it would give the weight of coal burned, and all the various results depending upon it.

The second sub-division of the second section, that relating to pumping engines, would present the special data in regard to the work of the water end of the engine, such as the quantity of water pumped, the number of feet lifted, and all the special data which are given in the report of the duty trial committee in vol. xii. of the *Transactions*. In this section would appear the results expressed in terms of "duty;" including the standard based on one million heat units.

In the third sub-division of the second section, viz., that relating to locomotives, there would be two parts; one pertaining to shop tests and the other to road tests; and in both of these, there would be the speial data pertaining to the work of the locomotive, as formulated by the report of the committee on locomotive tests in vol. xiv. of the *Transactions*, including the standard of efficiency therein determined, viz., the quantity of so-called "standard coal" used per dynamometer horse-power per hour.

In the fourth sub-division of the second section, that relating to engines for driving electric generators, data would be given embracing the quantity and intensity of the current generated, the electrical horse-power developed, and the efficiency of the generator. In the case of railway engines, this would also include the current delivered to the motors on the line, and expressions of efficiency based on car mileage.

The fifth sub-division of the second part, that relating to marine engines, would present such data as pertain specially to marine work, such as the quantity of coal consumed and the results bearing upon it, the speed of the vessel, the slip of the screw, and the tonnage moved a given distance per unit of power.

The above is an outline giving the main features of one method of formulating the tabular reports so as to secure the objects in view.

Returning now to the methods of obtaining the data, one of the most important elements of data required is the quantity of work which the steam performs. The work done by the steam in an engine cylinder has in the past been ascertained, and probably will continue to be ascertained, by the use of the steam engine indicator. The reliability of this instrument is the foundation upon which a correct determination of the engine's efficiency rests. How the indicator should be applied, how it should be operated, how its springs should be calibrated and how the diagrams which it produces should be read and investigated, are questions which should be settled by the proposed standard method of engine testing; and to these questions little attention has been given and little required at the hands of previous committees. It may not be out of place to recall the fact that there is no accepted method among engineers of calibrating indicator springs; and it seems to me that in the work suggested, investigation and recommendation should be made as to the best mode of dealing with this important subject.

If the suggested arrangement of the tabular reports be followed, they would be preceded by a similar arrangement of the methods laid down for determining the various data. In the first place, directions would be given for ascertaining the data of the first section, or that applying to all engines, whatever their type; and these would cover the ground with that completeness which characterizes previous reports. Much of the material applicable to engines in general, given in the reports of the duty trial and locomotive test committees would appear in this section, and would there be dealt with once for all. The second section would similarly be divided into the sub-divisions named, and in each of the various sub-divisions complete directions would be given for obtaining the special data applying to the individual case. In the matter of duty trials and locomotive tests, the sub-divisions would deal with all the directions laid down in the previous reports.

I have thus indicated, in a very general way, what may be done to standardize engine tests covering all classes of machines, not with a desire to anticipate the action of a committee, should the society see fit to appoint one, but rather to bring the subject to attention and "set the ball rolling."

Amalgamated Association Scale Convention.

In its concluding sessions at Cincinnati last week the Amalgamated Association of Iron and Steel Workers elected officers and selected Detroit as the meeting place for next year. The election resulted in the choice of the following: President, D. J. Shaffer, Pittsburg; secretary and treasurer, John Williams, Pittsburg; assistant secretary and treasurer, Stephen Madden, Pittsburg. Madden and Williams changed places. Ben L. Davies was elected as a new trustee. John Pierce and Daniel Mullane were re-elected trustees.

The scale changes are not important. The $4 puddling rate is reported retained, in spite of the protests of lodges which stood for the $4.50 rate. In the tin plate scale several demands for modifications will be submitted, the most important being a ten per cent advance in open-hearth steel; that shearmen on modern squaring shears be paid full tonnage scale, as passed by the last convention; to dispense with the 10 per cent allowance for sizes over 20 by 56, and to dispense with the 500 pounds allowance to make up for the week's work.

DOWN-TOWN STEAM PLANTS IN LARGE CITIES.

At a recent meeting of the Western Society of Engineers, Dankmar Adler read a paper on "Mechanical Plants of Large Buildings." The discusion developed a number of points of interest, particularly as to the advantage of the one-pipe system, and as to the waste of steam so common in connection with plants in large buildings. We take brief extracts from the paper and from the writer's answers to questions asked in the discussion:

"The ordinary practice in heating down-town buildings is to turn all exhaust steam into a special tank proportioned to the work to be done, also to connect this tank direct with the boiler; to interpose reducing valves set so as to maintain a uniform pressure, and prevent the tank from being under boiler pressure. The distributing mains are carried to the top of the building, sometimes in a single pipe, sometimes in several, more generally in a single pipe. They are distributed there in an attic between the top story and the roof; horizontally and at convenient points, downward mains are carried and connected at the different stories with radiators. The vertical pipes are generally securely fastened in the middle so as to allow expansion in both directions, both upward and downward. The steam and return, or water of condensation, travel in the same direction; they are taken up by a system of horizontal return pipes that is generally carried below the basement ceiling, and carried to a receiving tank below the water level, where the boiler feed pumps are which pump the water of condensation back from these receiving tanks to the boiler. Of course during very cold weather, when all the exhaust steam is used for heating, and considerable live steam too, all the feed water goes from this receiving tank; no fresh water is used. However, in moderately cold and mild weather, and altogether in warm weather, the exhaust steam is blown out into the atmosphere and must be replaced by the water taken from other sources, which is warmed in the ordinary manner through feed water hearers; very frequently the feed water heater and receiver are made in one.

"The system is really very simple. It cuts loose entirely from the boiler as an immediate source of steam supply, but, starting from the steam tank, which is kept at pressure anywhere from five pounds downward, the circulation is the same as it would be in a small residence heating plant, excepting only that while in the smaller plants the circulation is from below, here it is taken from above, so as to have the steam and the water of condensation travel in the same direction." . . .

"The main advantage in a one-pipe system lies in the fact that it reduces the number of pipes and fittings required and the number of valves required. The chief reason for its use is its economy. It requires less pipe and while the pipe is somewhat larger, the number of fittings is much smaller and the number of connections is much smaller and the number of valves is about half. When a building is very high, the volume of descending water of condensation becomes considerable when it gets down to the lower portion of the pipe, particularly in very cold weather, and the ascending column of steam is met at the very outset by a descending body of water and it is cooled and some of the steam is condensed. While it is true it goes back to the boiler and the loss is not so very great, still it is a loss, and it is a greater loss than the loss consequent upon sending steam from the top of the building into the big pipe and then sending it down from there. . . .

"I should say that we are getting to an era of cheap condensing apparatus, so that I am inclined to think that there are very few cases where, during the summer months, and during that part of the year when exhaust steam is not used for heating purposes, a condenser of some kind would not pay for itself in a few years. I do not think it would work any hardship at all to prohibit the discharge of exhaust steam into the atmosphere. That reminds me of this: During the World's Fair period I had a great many visitors at my office, which was then in the upper story of the Auditorium tower. Many of these visitors were foreigners, among them many Englishmen, and I think about every third one of the Englishmen could not understand our practice of blowing so much exhaust steam into the air. Such a thing would not be tolerated in England, they said. Then I asked them whether there were laws on the subject; they said it was not that, but that it would be taken for granted that any person engaged in any kind of business who would blow as much exhaust steam into the air as he saw from our various buildings, would be considered a little bit off intellectually, and not a fit person to trust in financial matters. A man who would be guilty of wasting as much fuel per annum as is implied by that volume of steam blown into the air, would be wasteful in other respects, and his credit was somtheing that would be worth looking after. That was the opinion expressed to me by several Englishmen. They did not realize how extravagant Americans are in every respect."

PRODUCTION OF OPEN-HEARTH STEEL IN 1897.

We present below preliminary statistics of the production of open-hearth steel ingots and direct castings in the United States in 1897.

The total production of open-hearth steel in 1897 was 1,631,843 gross tons, against 1,298,700 tons in 1896, an increase of 333,143 tons, or over 25 per cent. The following table shows the production of open-hearth steel ingots and direct castings by States during the past four years in gross tons:

States.	1894.	1895.	1896.	1897.
New England	26,204	36,733	48,055	51,402
New York	21,363	32,203	32,120	39,521
New Jersey				
Pennsylvania	659,969	904,352	1,009,608	1,294,923
Ohio	54,182	75,637	64,691	78,357
Illinois	23,218	49,500	101,832	120,609
Other States		38,757	42,394	47,031
Total	784,936	1,137,182	1,298,700	1,631,843

The open-hearth steel made in 1897 was produced by 68 works in 11 States—Massachusetts, Connecticut, New York, New Jersey; Pennsylvania, Alabama, Ohio, Indiana, Illinois, Wisconsin, Missouri, and California. The open-hearth steel rails produced in 1897 amounted to only 500 gross tons, against 705 tons in 1896.

Of the total production in 1897, 1,075,689 gross tons were made by the basic process and 556,154 tons by the acid process. In 1896 the production by the basic process amounted to 776,256 tons and by the acid process to 522,444 tons. Nine works made basic open-hearth steel only in 1897, 39 made acid open-hearth steel only, and 20 made both acid and basic open-hearth steel.

States—Gross tons.	Basic open-hearth steel.	Acid open-hearth steel.	Total. Gross tons.
New England	17,393	34,009	51,402
New York	10,268	29,253	39,521
New Jersey			
Pennsylvania	905,843	389,080	1,294,923
Ohio	24,177	54,180	78,357
Illinois	98,715	21,894	120,609
Other States	19,293	27,738	47,031
Total	1,075,689	556,154	1,631,843

The total production of open-hearth steel ingots and castings in the United States by districts during the last four years is given in the following table, in gross tons:

Years. Gross tons.	Eastern States.	Pennsylvania.	West and South.	Total.
1894	47,567	659,969	77,400	784,936
1895	68,936	904,352	163,894	1,137,182
1896	80,175	1,009,608	208,917	1,298,700
1897	90,923	1,294,923	245,997	1,631,843

Although our open-hearth steel industry is growing rapidly, it is still a long way behind that of Great Britain. Our great steel rival produced 2,317,555 tons of open-hearth steel in 1896 and 2,601,806 tons in 1897.—[The Bulletin.

EDWARD HAUPT, formerly president of the Universal Construction Co., of Chicago, and later with H. A. Streeter, of the same city, has opened an office at 507 and 508, 225 Dearborn st., Chicago, to represent Love Bros., manufacturers of structural and architectual iron work, and castings of every description.

LITTLE GIANT PISTON AIR DRILLS.

The tool illustrated herewith, the Little Giant piston air drill, has recently been put on the market and has already met with success. It is used for reaming, tapping, drilling, rolling and cutting flues, boring cylinders, facing valves and similar work. The machine is of the piston type, having a balance piston air valve, and a cut-off like an engine. As a consequence it is very economical in the use of air. It is simple in construction and is said to have absolutely no vibration. As the exhaust does not come in contact with the working parts it can be run in a bath of oil. The spindle has a screw-cut on the outside to receive chuck for reaming, tapping and boring cylinders.

The No. 2 drill, which is shown in the illustration, is 10 inches long and can be used with ordinary shop old man, and can be operated within three inches of a corner. The No. 2 drill, weighing 19 pounds, is claimed to be unique in its ability to ream and tap up to one inch, and drill up to one and a quarter inches. The method of operation of the tool is shown in the larger illustration. The Little Giant drills are made by the Standard Pneumatic Tool Co, 1535-1536 Marquette Bldg., Chicago. The Company also manufactures Little Giant boring machines, pneumatic hammers, pneumatic blow-off cocks and all kinds of pneumatic tools and appliances. More complete information and a catalogue will be furnished on application to the company.

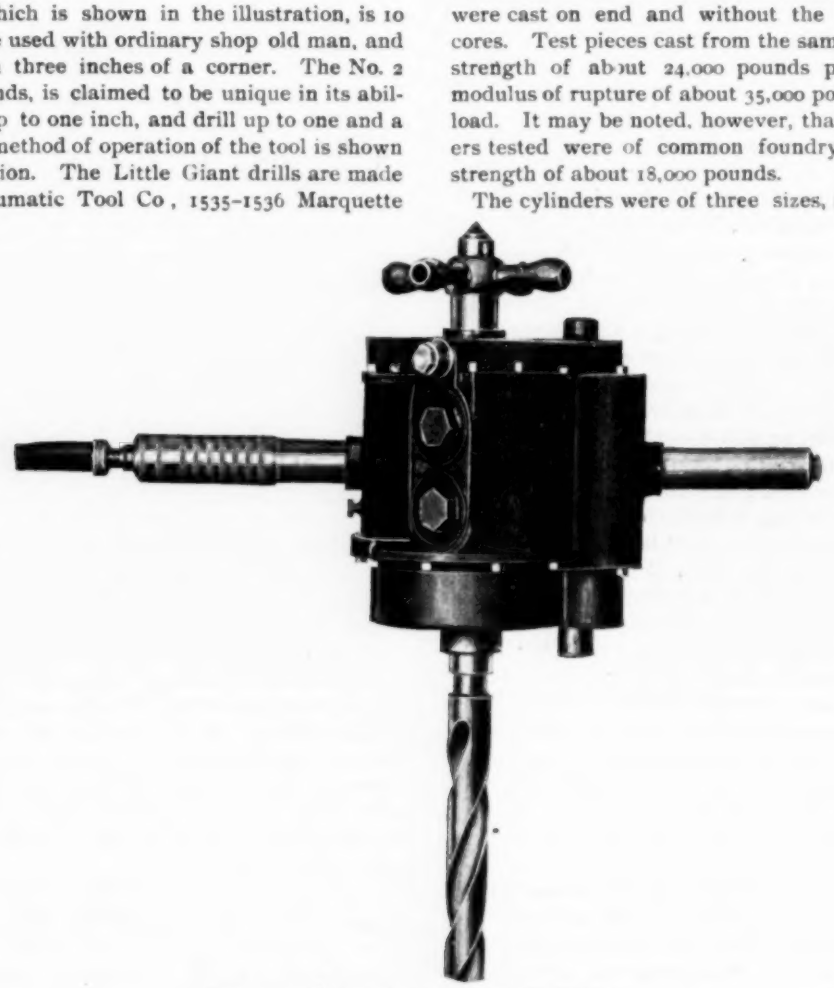


FIG. 1.—LITTLE GIANT PISTON AIR DRILL.

Heavy Demand for Electrical Equipment.

T. C. Martin, editor of the *Electrical Engineer*, says of the demand from the Government for electrical machinery and equipment: "Manufacturers of dynamos, searchlights, copper wire and electrical goods generally are working 24 hours a day on Government orders. The Government has even taken all of the unusually big and fine searchlights which had been ordered for the Omaha Exposition and were expected to be such a feature there, and it will be a difficult matter to discover any bare copper wire in the market. Commercial orders will simply have to wait, for all the large companies have enough Government orders ahead to keep them busy for two or three months. This rush of work has existed every since the beginning of the war, when our authorities suddenly awoke to the fact that our best and newest war ships were very defficient in modern electrical appliances, and that the forts in our harbors had no means of intercommunication. The additions to our fleets required complete outfits, telegraphic cables had to be laid, and intricate systems of wires arranged in connection with submarine mines. We have met the necessities of the situation more promptly and more satisfactorily than would have been possible with any other nation, for we have resources in this direction which they have not."

EXPERIMENTS ON CAST IRON CYLINDERS.

A paper under the above title, by Prof. C. H. Benjamin, of Case School of Applied Science, Cleveland, was read at the meeting of the American Society of Mechanical Engineers at Niagara Falls this week. The following extracts and condensation are given:

For several years past the writer has been conducting a series of experiments to determine the bursting strength of cast iron cylinders under water pressure. The cylinders used were cast by the Taylor & Boggis Foundry Co., of Cleveland, from a special foundry mixture, such as they ordinarily use for water and steam cylinders. The metal showed a fine gray fracture and a surface close and free from holes. The cylinders were cast on end and without the use of chaplets for the cores. Test pieces cast from the same iron showed a tensile strength of about 24,000 pounds per square inch, and a modulus of rupture of about 35,000 pounds, under a transverse load. It may be noted, however, that the first three cylinders tested were of common foundry iron, having a tensile strength of about 18,000 pounds.

The cylinders were of three sizes, six, nine, and 12 inches internal diameter, and of lengths approximately twice the diameters.

The flanges and heads were made of extra thickness that the rupture might always occur in the shell of the cylinder. The cylinders were bored in such a way as to insure a practically uniform thickness in each shell, and the flanges were faced and counterbored. Steel bolts, having a tensile strength of about 80,000 pounds per square inch, were used to fasten on the heads, in such numbers as to give an excess of strength and to prevent leakage.

A single-acting plunger pump, with a plunger, seven-eighths of an inch in diameter was used for raising the pressure, being connected to the head of the cylinder by extra heavy iron pipe with bronze fittings. The body of the pump and the gland were of bronze and the plunger of machinery steel. For packing, washers of belt leather gave as good results as anything which was tried, and but little trouble was experienced with the pump itself. It was found, however, almost impossible to obtain any check valves which would work satisfactorily at the higher pressures. Numerous types of valves were tried, swing check and drop check, metallic face and rubber face, but they all leaked. Either minute particles of dirt would get under the valves or the slip would be so great as to forbid increase of pressure beyond a certain point.

Following the old adage, "In a multitude of counsellors there is safety," we finally overcame the difficulty in a meas-

ure by using two valves on each side of the pump. To determine the pressure we used a Crosby hydrostatic gauge, graduated to 2,000 pounds, located on the pipe close to the cylinder. An attempt was made to use a Bristol recording gauge, located on the cylinder head, but the jar of the final rupture blotted out all records on the dial.

Before testing, each cylinder was calipered inside at six different points, three measurements being taken in each of two meridian planes at right angles to each other. Gauges, consisting of hard wood sticks, slightly pointed at the ends, were fitted one at each point and then numbered to correspond. After the rupture of the cylinder, the increase in diameter was measured by using the same gauges, inserting pieces of hard calendered paper between the ends of the gauges and the shell, and then measuring the thickness of the paper with a micrometer caliper. The deformations as thus measured were very slight, ranging from .004 to .012 inches, but no law could be determined.

Each cylinder was carefully examined for flaws of any description. If any small blow-holes were found they were filled with lead or tin hammered in, and then the surface was covered with a coating of paraffine. The cylinders were as free from flaws as could be expected. Of all the difficulties encountered the most serious was that of finding any satisfactory packing for the heads of the cylinders. We tried successively brass wire gauze filled with soap, copper wire, lead wire, soft rubber with graphite and vulcanized rubber. The metal gaskets all failed on account of their lack of elasticity. Although tight at the lower pressures, being compressed by the bolts until the soft metal was squeezed into every irregularity of the cast iron surface, they failed to respond when the bolts were stretched by the water pressure, and the water would run through in streams. This fact is interesting as showing that the initial tension caused by screwing up the nuts has no effect on the tension under pressure when a non-elastic gasket is used.

The tensile strength of the bolts used in these experiments was much in excess of the strength of the cylinder, and yet, under the comparatively low pressure of 400 pounds to 600 pounds per square inch, the bolts stretched enough to practically relieve the reaction of the gasket. The elastic rubber gaskets failed principally on account of weakness, usually blowing out as the pressure was increased. Vulcanizing by heat made them stronger but less elestic. Acting on the suggestion of Mr. Caldwell, of the Worthington Co., we then counterbored the cylinders to a depth of about one-eighth of an inch, fitted a circular projection on the head closely to the counterbore, and introduced a gasket made of strawboard soaked in boiled linseed oil. The strawboard was cut to fit the counterbore, thoroughly saturated with the oil, and then allowed to stand several hours before being put in position. Allowing the gasket to harden for 24 hours after screwing down and before putting on the water pressure is an additional safeguard. It is probable that the counterbore had as much to do with the success of this method as the material used for packing, but the gasket must be elastic to insure tightness. In one or two instances where the projection on the head was of slightly less diameter than the counterbore, the packing blew out.

Another serious difficulty was encountered in the presence of minute blow holes in the shell of the cylinder. Some of these were almost invisible to the naked eye, but as the pressure rose the water would spurt in slender streams to a distance of several feet, in such quantity as to render further increase of pressure impossible. The only remedy in such cases was to peen the interior surface slightly with a round hammer and then coat it with paraffine. Even then the water would ooze from the iron at every pore as if it were in a violent perspiration. Before beginning each experiment the air was forced out of the cylinder through a small vent at the top. The pressure was then gradually applied until rupture occurred. It was found impracticable to make any measurements of the exterior diameter during the test, the changes being so very minute.

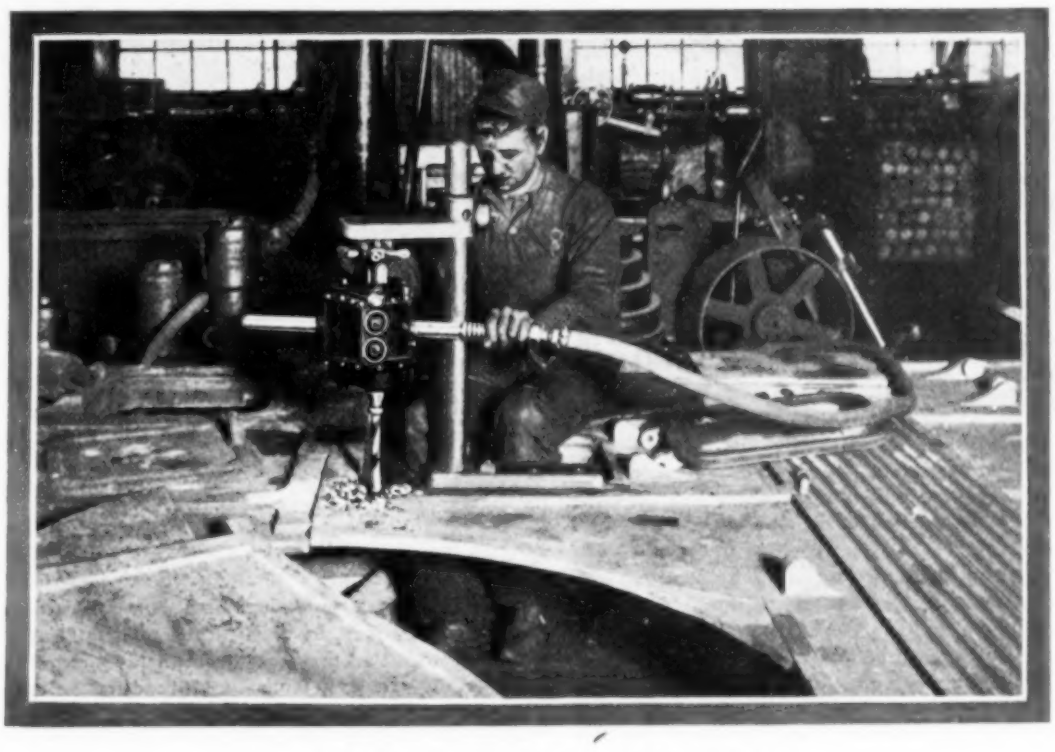


FIG. 2.—LITTLE GIANT AIR DRILL IN OPERATION.

The conclusions drawn by Prof Benjamin from these experiments are:

1. That cast iron cylinders of the form ordinarily used for engines, when subjected to internal pressure are quite as likely to fail by tearing on a circumference as by splitting.

2. That by reason of local weaknesses and distortions the cylinder may fail when the stress, as calculated by the ordinary formula for thin shells is only about one-third of the strength shown by a test bar.

3. That the principal cause of weakness is the sponginess of metal due to uneven cooling; that to insure good castings the flanges should not be materially thicker than the shell, the cylinders should be cast on end and suitable visers provided for the escape of dirt and gas.

4. That the proof of a pudding is in the eating and the proof of a cylinder in the testing.

A PHILADELPHIA special notes that the Pennsylvania Steel Co. now furnishes employment for 7,500 men, an increase of nearly 1,000 over the early months of the year. The volume of business has greatly increased, though without a satisfactory return in profits. Shipments are made at the rate of about $1,000,000 a month.

BLAST FURNACE GAS IN GAS ENGINES.

The problem of the direct employment of blast furnace gas for motive power has had no little attention from iron masters and metallurgical engineers in Great Britain, Belgium and Germany in the past few years. One of the most important plants at which gas engines have been operated with the gases from blast furnace stacks is that of the Société Anonyme John Cockerill, at Seraing, Belgium. The West of Scotland blast furnaces at Wishaw have had gas engines at work, driven by furnace gases, in the last three years, and other furnace companies in the United Kingdom have been working along the same line. The subject was discussed in a paper presented before the Iron and Steel Institute at its recent meeting in London, by Adolph Greiner, director-general of the John Cockerill company; and the results of British investigation and practice were embodied in a paper read the same week before the British Iron Trade Association by B. H. Thwaite. In the latter paper some very surprising statements are made as to the economy of the direct use of gas as power. Mr. Thwaite says:

"The economic results of the Thwaite-Gardner blast-furnace power system are almost startling, for, whereas with blast-furnace gas-fired Lancashire boilers and with ordinary good steam-engines some 400 to 500 cubic feet of blast-furnace gas, consumed at atmospheric pressure, are required to develop one indicated h. p. of energy for one hour, with the new system from 80 to 120 cubic feet only are required to develop the same power. The economicadvantages of the new blast-furnace power system, compared with that of steam power in everyday practice, is as 4 to 1 in favor of the former. The Thwaite-Gardner system is being applied on a large power scale to important works in the North, the South, and the East of France, in Westphalia, Germany, and in several important works in Great Britain."

In the latter portion of the paper is this interesting statement on the relation of the new system to high blast pressures, which British furnace practice has been slow to adopt: "An alternative method of utilizing the available power is to apply it for the purpose of obtaining an increased air blast pressure. The economic advantages of increased air blast pressures have been adequately demonstrated by the latest American practice—unfortunately in the majority of blast furnaces it would be impossible with our existing steam boiler plants to increase the present range of pressures, but the new system, in one of its patented applications, permits the existing blowing engines to be run at a higher speed with very little alteration, so that not only is a startling economy possible, but this is accompanied with an increased iron out put by reason of the higher air-blast pressures. The existing boilers are rare ly safe under pressuresexceeding 30 lbs.—this means at the blast engines, in all probability no greater average piston pressure than 25 lb.—whereas the average pressure on the piston by the new system will not be less than 70 lbs., or nearly three times the average pressure in ordinary existing steam practice. The regularity of driving in the new system is remarkable, and the fact that the piston speed of the gas engine runs four times greater than that of the ordinary steam-engine is some explanation of this fact."

Results Attained at Seraing.

The paper of M. Greiner before the Iron and Steel Institute contains much detail concerning the performance of the gas engines at Seraing. We make the following extracts:

"Mr. Hubert, in his pamphlet, bases his calculations on the average output of gas and steam engines, and by this means obtains a surplus power of 12,000 h. p., or 2,000 h. p. per 100 tons of pig-iron. There is no exaggeration in these estimates, and even if they are reduced by one-half there is still an advantage of 1,000 h. p. per 100 tons of iron. Such an advantage may well attract the attention of manufacturers to this new departure in the production of iron and steel. It is not more than a quarter of a century since it was the custom to burn the gas at the mouth of the furnace. The direct utilization of gas in prime movers without the intervention of steam generators, and the consideration of the blast-furnace as the greatest and surest source of power, are novel developments which will not await the next century for their full realization. Certain the progress at the beginning has been slow. Gas-engines are not working everywhere like steam-engines. Different types are being tried at Wishaw, at Hoerde, at Differdange, and at Seraing, but without the future rail mill, including the Bessemer converters, driven simply by blast-furnace gas, is a fascinating subject for investigation. When a 200 h. p. gas-engine has run successfully for six months, manufactures will be emboldened to put up one of 500 or 800 h. p. to drive the blowing-engines for a blast-furnace or converter plant, and thence to a rolling-mill engine is an easy advance. Those who intend to travel on these lines ought to draw much encouragement from these successful trials, lasting over two years, at Seraing, with the little 4 to 8 h. p. gas-engines. With gas as dusty and as variable as blast-furnace gas is, any hesitation in an attempt to use it was very pardonable; but now experience has spoken, and experience is paramount.

"A short description of the great 200 h. p. engine at Seraing may be of interest. Gas from the blast furnace gas mains is led through three pairs of coke scrubbers, 1.5 metres in diameter and 6 metres high (5 by 19⅔ feet). The coke is washed with water delivered by Korting spray producers. The gas passes successively through the two scrubbers of each of the three pairs and then straight to the engine. It may be sent at will through a gasholder which is used for testing or as a reservoir in case of eventualities. The gasholder is 12 metres (39⅓ feet) in diameter, and has a (lift of 3 metres (10 feet). It holds 300 cubic metre (10,600 cubic feet). Gas is drawn through it by a fan driven by an electromotor. The gas-engine is of the four-cycle type, with a single horizontal cylinder 800 millimetres (31½ inches) in diameter, and a stroke of 1 metre (39 37 inches). It runs at 100 revolutions per minute. The connecting rod works on to a counterbalanced crank shaft. The fly-wheel is 4 metres (13 feet) in diameter, and weighs 15 tons. Compression in the cylinder is carried up to 8 kilos. per square centimetre (about 8 lbs. per square inch). Ignition is produced electrically, and is adjustable; the governor is outside, and the whole build of the engine is simple and strong.

"It was proposed to utilize this engine for running a belt-driven dynamo for power and lighting purposes, but this will be done with the second engine, and the first will be used for driving an air-compressor directly off the main shaft. The air, compressed to five atmospheres, will be led by pipes to different machines and pumps, which are now driven by steam at the same pressure. A simple cock will enable steam or compressed air to be used at pleasure.

Objections to the Furnace-Gas-Engine.

"A number of objections have been offered to the use of gas-engines driven by blast-furnace gas. The chief of these is the trouble that may arise from the dust carried by the gas. At Seraing the gas from the furnaces is no cleaner than in other places, but rather the contrary. Purple ore or blue billy to the extent of 20 per cent is used in the ore charge, and the gas mains are not provided with large dust-catchers, as in more modern works. Thirteen and a half tons of heavy dust is collected daily from two blast-furnaces, which together produce 300 tons of pig-iron, and this is equivalent to 10 grammes per cubic metre. This dust, which chiefly consists of purple ore, contains about 50 per cent of iron and is returned to the furnace. In addition, another 3 tons of light

	In the gas-pipe leading to the boilers at 20 meters from the furnace.	In the gas-pipe leading to the boilers at 60 meters from the furnace.	In the first flue in the boilers.	In the last boiler flue.	In the smoke flue at the entrance of the chimney.
	Per cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Volatile matter	11.00	9.30	—	1.20	2.50
Insoluble residue (aluminium silicates)	13.00	15.40	19.00	21.80	22.00
Iron	33.85	29.45	19.15	8.05	10.10
Manganese	0.75	1.25	1.35	1.80	2.85
Lime	9.10	13.20	17.40	18.75	17.25
Magnesia	0.90	1.10	1.60	1.60	1.65
Alumina	9.50	15.20	12.30	18.55	17.80
Zinc	1.50	4.40	5.10	6.20	9.30
Sulphur anhydride	1.18	1.70	4.55	9.00	6.50
Sulphur	1.60	1.30	1.10	trace	trace
Chlorine	trace	0.30	trace	0.24	0.35
Alkalies	3.50	6.70	9.30	8.70	4.40

dust is collected daily by cleaning out the mains and washers. This corresponds to 2.2 grammes per cubic metre.

"Mr. Hiertz has analyzed the dust from blast-furnace gases at Seraign, the blast-furnaces consuming about 20 per cent of pyrites residues and 80 per cent of Bilbao ore. The results obtained were as shown in the table (p. 14).

"These analyses show that near the furnace the dust deposited contains chiefly ferric oxide, and that, as the chimney is approached, the dust becomes richer in silica, alumina, lime, zinc, sulphuric acid, and alkalies, as might be expected.

"As regards the impalpable dust carried forward by the gas into the gas-engine, no details of its amount are available. According to Mr. Lurmann, of the Gutehoffnungshütte, there remains about two grammes of dust in the washed gas after all possible means of purification. At the Georg-Marienhütte, Osnabrück, an average of 2.91 grammes of dust was found in a cubic metre of washed gas. Round figures of two grammes and a 200-h. p. engine using four cubic metres of gas per h. p. hour would give 40 kilogrammes or 88 lbs. of dust daily. Happily, nearly all this will pass out with the exhaust, as is shown by the 8-h. p. engine, which ran for four months without necessitating a clean-up of the cylinder. All the dust was thrown out in the form of a translucent white smoke. It would be difficult to find gas-fired boilers which had run four months without cleaning. Besides, it is no more requisite to use thoroughly clean gas in a gas engine than it is to use distilled water in a boiler.

"The second objection attributes a destructive action to the dust, due to the acid matters, especially sulphuric acid, that it contains. Analysis, indeed, shows sulphuric and phosphoric acids, besides chlorine; but the alkalies and lime also present probably neutralize their effect. It is not necessary to use an inordinate quantity of water for washing purposes, and no corrosive action has been observed in two years. The only part that requires cleaning after a few months is the ignition appliance; but even that shows no sign of corrosion, and it can readily be replaced in a few hours. A comparison with the time taken for cleaning and repairing a boiler and its setting leaves no doubt on which side the advantage lies.

"A third objection to the use of blast-furnace gas depends on the irregularity of its composition. This objection is not so serious as it appears. In the first place, the gas-engine readily accommodates itself to the variable condition of the gas, and experience has shown that when the gas ignites with difficulty under the boilers, it is not too bad to affect the regular operation of the engines. Even if the furnace is not running well, and the gas becomes non-inflammable, the same inconveniences occur with both boilers and engines. Coal has to be burned on the boiler-grates, and it would have to be used in gas producers for the engines.

"It has also been observed to the disadvantage of the gas-engine, which usually runs at 100 to 120 revolutions per minute, that this speed must be reduced one-half to two-thirds in order to drive such machinery as blowing engines. In reply to this it may be stated that gas-engines of 50 h. p. run at 150 to 180 revolutions, whilst those of 200 h. p. run perfectly well at 100 revolutions; so that it is probable that one of 400 to 500 h. p. would work at 75 to 8 revolutions. As the valves of many compressors run at 50 to 60, and some even have been made at Seraing to work at 75 times per minute, it is not easy to see why they should not have a greater speed. It is a problem for the mechanical engineer to solve.

"In conclusion, a summary of the advantages accruing from the use of gas may be given. Gas is, above all other means, the most suitable for transmission of power. In a factory where motive power is required at scattered points, there are many advantages in a central producer plant from which gas is led to gas-engines at the requisite places. Blast-furnaces are gas producers ready to hand, and when there are two or three together, there is not much danger of very great variations in the quality of the gas. Gas can be supplied with ease under a low pressure, and without appreciable loss by leakage or condensation, to considerable distances. The mains and pipes are simple, light, and economical. Boilers and the dangers accessory to their use may be abolished. Gas shares with electricity the advantage of directly giving light, heat, and power, and this alone is sufficient to insure its use by manufacturers and its general application in metallurgical works."

British Practice vs. Belgian.

The discussion on M. Greiner's paper was opened by Mr. James Riley, who had had the Thwaite-Gardner system in use at the plant under his direction. Mr. Riley said that to Mr. B. H. Thwaite belonged the credit of inaugurating the use of blast-furnace gas in gas-engines. He himself knew of this proposal in the autumn of 1894. In February, 1895, in his present management, he had the opportunity of making a trial of the proposal, and arranged very shortly afterwards that a trial should be made. A gas-engine of 14 or 15 h. p. was set to work at Wishaw. Their experience was perfectly satisfactory. They got the whole power of the engine, not half, as had been obtained at Seraing. The gas that they used, before it reached the gas engine, had been passed through the recovery plants for the recovery of ammonia and tar products, so that it was undoubtedly clean gas, but it was impoverished to a considerable extent. They assumed that about 130,000 cubic feet of gas came from a ton of coal. Their friend had taken 157,000, if he remembered rightly, cubic feet; and they were of opinion that he had slightly understated that, and that it might be taken at 180,000 cubic feet from the coke furnaces. They assumed 130,000 in their calculations, as they measured their gas, the plant that they had at work having a gasholder, etc., so that portion of their statement might be assumed as absolutely correct. They knew the quantity of gas that was used; they knew also the power that was developed. With these two factors they arrived at the conclusion that with 130,000 cubic feet of gas per ton of coal they used something like 1.6 lb. of coal per brake h. p. per hour. But besides that they had cleaned the gases, and no account was taken of the impoverishment of the gases in the statement he had just made. They had taken from the gases what might be assumed as realizing, perhaps, 20 per cent of the original cost of the coal—an important factor. They had very little trouble at all with the engine. There were some changes to make in the beginning; the passages, as related by their friend, were too small. They had to be enlarged; there was a little trouble about the ignition. He noticed and admired the way that they were getting over that difficulty by the use of electrical ignition. With these results obtained, he felt perfectly justified for having made the experiment, and he was justified in commending the gentleman to whom was due the credit of the commencemnet of these operations, Mr. Thwaite. He should perhaps say, before passing on, that an engine had been for a good many months working in connection with the coke-fed blast-furnace in Lincolnshire, consequently under similar conditions to those stated by their friend. He knew at this moment arrangements were completed for the putting down, at one of our large works in this country, of a gas-engine, to be worked with blast-furnace gas, 250 h. p.—rather larger than that which their friend was getting to work at Seraing. Therefore, matters were progressing in the direction of the use of these gases. As they were so frequently accused in this country of not having enterprise, he wanted rather to indicate that the good old country led in this matter, as it had led in many another. He would, if they would allow him, read some figures which had been worked out, and which might perhaps act as a check upon what he considered the sanguine figures of the author of the paper. They were based on the assumed work of two furnaces making 800 tons per week each of Bessemer pig iron from hematite ore, Durham coke, and limestone, the coke per ton of pig iron being taken at 20½ cwt. These figures were as follows:

Total pig-iron per week, 1,600 tons.
Total coke used per week, 1,640 tons.
Coke per hour, $\frac{1,640}{168}$ = 9.76 tons.
Gaseous production, at 177,240 cubic feet per ton of coke, per hour, 1,729,862 cubic feet.
Thermal value of gas per cubic foot in heat units, 100.
Total thermal value of gases per hour, 172,986,200 B. T. U.
Cubic feet of gas expended per I. H. P. hour in gas-engine, 79.12.
Thermal limits per I.H.P. hour 7,912.
Total I.H.P. from gases, 21.863 = $\frac{1,729,862}{79.12}$
Air blast required per hour, estimated to equal 46 tons, 1 3 040 lb.
The thermal expenditure in heating air-blast to 1210° Fahr.—103 040 x 325=33,488,100 B.T.U. per hour.
Motive power required for producing air-blast, 1,000 I.H.P. 1,000 I.H.P. at 542 cubic feet of gas in boilers per I.H.P. per hour=542,000 cubic feet: 542,000x200=54,200,000 B.T.U. per hour.
Total heat available after allowing for the heating of the blast and for generating steam for driving the blowing engines, 85,298,000 B.T.U. per hour.
Calculated available indicated horse-power, 10,780,
Compared with burning the gas under boilers, the advantage of the new system is as 450 is to 100, or $\frac{450}{100}$ = 450 per cent.
Indicated horse-power available for each ton of pig-iron, 6.73.

The speaker thought Mr. Greiner had put down something like 10 h. p. for one ton of pig iron made, but the figures he himself had just placed before the meeting showed only 6.73 of indicated h. p. for one ton of pig iron made.

NEW BLAST FURNACE IRON NOTCH.

A recent device of John M. Hartman, of Philadelphia, is a blast furnace iron-notch and appliance, as shown in the illustrations below. It is calculated to facilitate the ready manipulation of the parts of the iron-notch and those which surround it, to reduce wear and to control the flow of iron effectively and quickly. Fig. 1 is a vertical central section, through the iron-notch and adjacent parts showing in side elevation the gun used for stopping the notch. Fig. 2 is a horizontal central section through the iron-notch and adjacent parts. In the cuts, A is the furnace wall, with an opening A^1 for the iron-notch, and having the usual external jacket. This jacket is constructed in sections a a^2 bolted together, and in the region of the crucible and adjacent to the iron-notch comprising a series of open troughs a', containing water. The iron-notch consists of a hollow plug B, of plumbago, in the form of a truncated cone whose inner end fits snugly within the opening A' of the furnace-wall. The outer end of the plug B fits in a fire-brick lining E, which is supported within a swinging door D. This door is made of considerable depth, converging inwardly, and has a deep circumferential flange d surrounding its inner end, so as to form an open channel for the circulation of water, which is supplied at the top and bottom by means of the pipes g g', the water being played freely upon the surface and allowed to escape.

Of the advantages of this notch and the practical operation of his appliance, the designer says:

"Assuming that the furnace has been tapped and the iron discharged to the requisite level through the iron notch B, when the time arrives for stopping said notch the gun M (which has been charged with clay stopping) is rapidly swung

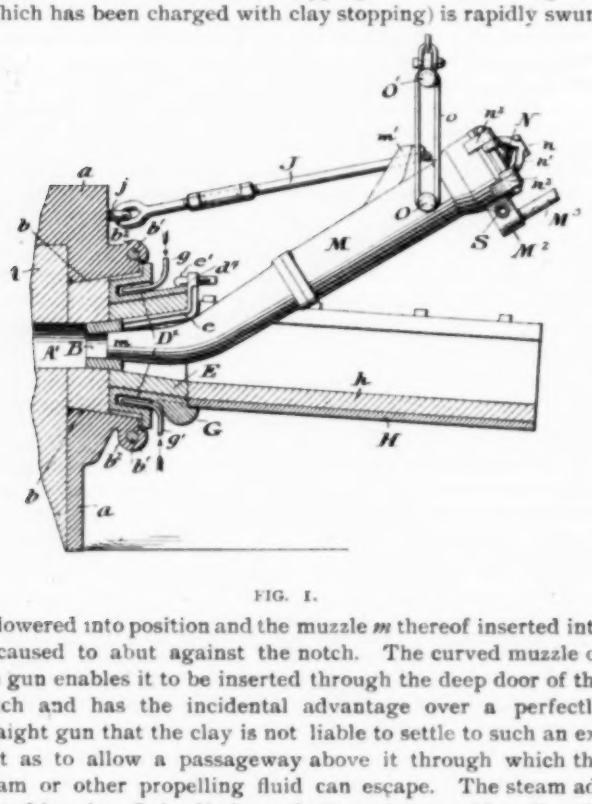


FIG. 1.

or lowered into position and the muzzle m thereof inserted into or caused to abut against the notch. The curved muzzle of the gun enables it to be inserted through the deep door of the notch and has the incidental advantage over a perfectly straight gun that the clay is not liable to settle to such an extent as to allow a passageway above it through which the steam or other propelling fluid can escape. The steam admitted by pipe S is discharged through an orifice directly along the bottom portion of the gun's bore, and thus sweeps before it the lowest stratum of the clay, which tends to adhere to the bottom in these guns. Thus a complete and uniform discharge of the contents is obtained. The gun is of sufficient capacity to contain a very large mass of stopping—much more than would be required for merely filling the mouth of the iron-notch. Hence when the discharge takes place the stopping is ejected and forced through the aperture of the notch into the interior of the furnace. Usually the wall of the furnace adjacent to the notch is cut or worn away, as indicated at A^3, and the first effect of the surplus discharge is to distribute itself along the inside face of the wall, as indicated at A^4. The surplus material thus distributed not only tends to replace to a certain extent the burned-away wall, but forms a key, as it were, to lock the stopping in place within the notch and thus prevent it from being forced out by the internal pressure.

"When it is desired to reopen the notch for the next tapping, the pricker-bar is driven clear through the clay itself, as indicated at B', Fig. 2, which thus forms a renewable bushing around the inner face of the opening. When it becomes necessary to renew the iron-notch B or for other purposes to obtain access to the interior, this may be quickly effected by knocking out one of the keys f^2 or f^3 and swinging back the door D upon the yoke F F', whose key still remains in position. If desired, an entirely new door can of course be quick-

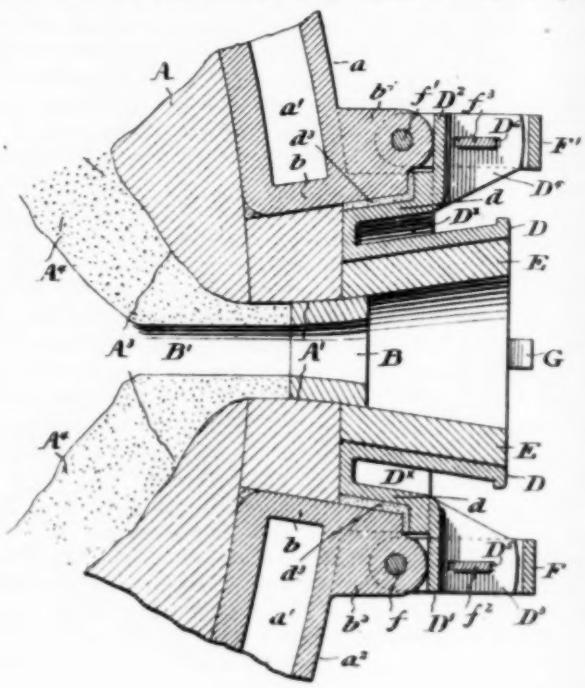


FIG. 2.

ly substituted for the old one by removing both keys f^2 and f^3. Thus the parts can be readily manipulated and the notch stopped very quickly, conditions which are of the utmost importance where nearly continuous or very frequent running of the iron is desired. For reasons which are now coming to be undertsood such method of running is highly advantageous, and the present organization therefore lends itself advantageously to other devices which tend toward this result.

"I am aware that it is not new to use a mechanical discharging device or gun for the application of clay stopping to a notch; but as hitherto employed by others such devices have been provided with internal pistons for the ejection of the clay. This arrangement not only complicated the parts and rendered the apparatus liable to be impaired by the drying of the clay within the bore, but did not admit of the discharge of a large amount of stopping. Hence it was necessary with these former devices to apply several successive charges in order to obtain a proper amount of stopping in the notch. Not only is the delay incidental to such a method of procedure very undesirable and the risk of forcing out an incomplete stopping a serious disadvantage, but the stopping itself is not, even when complete, satisfactory in its character. The successive layers as they are applied do not coalesce thoroughly, since the surface of the first is usually dried to some extent before the second one can be applied. Consequently the stopping is weak and the advantage of obtaining an internal overflow to form a key to hold the stopping in the notch is not practically obtainable."

THE British steamer Norge sailed from Baltimore last week for Kingston, Jamaica, loaded with 2,000 tons of coal and 2,800 tons of steel rails, the latter to be used for an electrical road now building at Kingston, and being a part of a 4,000-ton order. The British steamer Dulwich sailed from Sparrows Point, May 21, for Vladivostock, Russia, with a consignment of 4,700 tons of rails. It was the first shipment of the order for 40,000 tons placed with the Maryland Steel Co. by the Russian Government for the Trans-Siberian Railroad a few weeks ago. The steamer Cabral will take a second cargo for the same port. Both vessels will go by way of the Mediterranean and the Suez Canal.

CHILLED VS. STEEL TIRED WHEELS.

H. M. Boies, of Scranton, Pa., writes to the *Railroad Gazette* an article on chilled iron versus steel-tired wheels, in which occurs the following:

"We do not believe it is possible, even with the present cheap pig iron, to make a first-class cast iron wheel to be sold at $5. or $0.0083 per pound The locomotive builders' price-list is $8 50 for 33-inch cast wheels Let us assume that the best cast wheels can be had at $7 each and that they are good for 60,000 miles, as stated, and that the steel-tired wheels cost $40 each with the tire 2½ inches thick. The present open-hearth tire with fair usage is good for 40,000 miles at least to the ⅛ inch thickness, or 480,000 miles to a 2½-inch thick tire. Very many of these tires run over 600,000 miles, and some have made, and others are now running, at the rate of 1,000,000 miles. The best steel-tired wheels can be readily retired indefinitely in any railroad shop where a locomotive driver can be retired, and the value of the old tire is equal to the cost of retiring above the cost of the new tire. How does the comparative cost appear with one retiring?

First cost of a pair of steel tired wheels	$80 00
Cost of two new tires	40.00
Cost of seven turnings and shop handling	10.50
Cost of seven removals and replacements at 60 cents	4.20
Total	$134.70
Credit by price of two old wheels	10.00
Cost per pair for steel tired wheels to run 960,000 miles	$124.70

"To make this mileage 16 pairs of cast wheels would be required,

Costing (ground)	$230.72
Cost of 16 replacements at 60 cents	9 60
Cost of 16 shop handlings	3.20
Cost of 16 strippings, borings, and remountings	4.00
Total	$247.52
Less value of 8 tons scrap wheels at $10	80.00
Net cost of cast iron wheels to run 960,000 miles	$167.52
Net cost of steel tired wheels to run 960,000 miles	124.70

"Difference in favor of the steel tired wheels, $42.82, or $0.043 per 1,000 miles run, and the wheel center should still be good for other retirings, which would reduce the cost of mileage. We have taken Mr. Sanderson's rates of costs, except for the value of old steel-tired wheels and tires. Mr. Sanderson displays some lack of consideration in his argument concerning what he terms 'the other important item of cost to be considered, and that is rail wear.' Steel tires are not made of 'soft steel' at the present time. The study of the tire makers is to make their tires as hard as is consistent with other good qualities, and they rarely allow their steel to run below 0.60 carbon, so that the wear of the tire and rail may be reduced to the minimum. A good tire in use glistens like a mirror, and wears the rail far less than the rough chilled iron.

Electric Equipment for Tack Mills.

Among the prominent manufacturing firms that have recently adopted electricity for shop power is the Atlas Tack Co., of Taunton, Mass. A 150 k. w., 440-volt, 3,000 alternation Westinghouse three phase generator has been installed, together with nine of the Westinghouse type "C" motors, for the operation of three large tack mills, extending for a radius of 1,500 feet about the power plant. The installation of this apparatus will enable the purchasers to shut down two steam plants, to cut out a great deal of long shafting, and to increase greatly the efficiency of the entire plant. Some 20 or 30 additional Westinghouse motors are to be installed in a short time, together with a 1,000 light Westinghouse dynamo.

Increasing Use of Pneumatic Power.

Some indication of the widening range of applications of compressed air power appears in the sales report of the Clayton Air Compressor Works, Havemeyer Bldg., New York, for the months of February, March and April. In all, 19 air compressors were sold for operating pneumatic stone tools, chipping and calking tools, air hoists, etc.; nine air compressors for moving and elevating acid and chemical solutions, four air lift pumping plants were installed and placed in operation, three air compressors were furnished to rubber works for removing hose from mandrels, testing hose and inflating tires; one compressor was supplied for the pneumatic transmission of messages, two for oil-burning plants, three for racking off beer in breweries, one for spraying brick in the process of manufacture, and six for unusual applications of compressed air power. In addition to this number furnished at home four were exported to Europe for operating pneumatic shop plants. Among the orders of especial interest included in the above summary are the plant installed at the Navy Yard at Brooklyn, N. Y., for supplying pneumatic drills, paint machines and hammers, and one furnished to the Yarrow Ship Yard, London, for operating pneumatic tools. Another installation of interest is the compressor at the Dunn Bldg., New York, which supplies compressed air dusting nozzles for cleaning the iron grill work of the elevator shafts. Among orders now in hand is a large compressor for the Bath Iron Works, Bath, Me., to operate pneumatic tools.

Southern Pipe Works Consolidation.

The recent Chattanooga meeting of representatives of Southern cast iron pipe is reported to have carried out the plan under consideration ever since the litigation against the Southern pipe pool, and organized a consolidated company with $2,000,000 capital and $1,500,000 bonded indebtedness. The following works are included: Howard-Harrison Iron Co., Bessemer, Ala.; Anniston Pipe & Foundry Co., Anniston, Ala.; South Pittsburg (Tenn.) Pipe Works, and Chattanooga Foundry & Pipe Works, with two plants, one at Chattanooga and one at Bridgeport, Ala. The officers of the new company are F. S. Miller, Anniston, president; David Giles, Chattanooga, vice-president; J. K. Dimmick, Anniston, second vice-president and general manager; E. B. Thomason, Chattanooga, general sales agent; M. Llewellyn, Chattanooga, treasurer; J. R. Rice, South Pittsburg, secretary. The new company will have its headquarters at Chattanooga, but it was incorporated under the laws of West Virginia.

Birmingham's Basic Steel Project.

N. Baxter, president of the Tennessee Coal, Iron & Railroad Co., announced on his return to Birmingham, Ala., from New York last week that work on the long projected basic steel plant of the company would begin within 90 days. It is said the $1,000,000 issue of bonds for the new plant have been subscribed and the stockholders will be the Tennessee company and New York capitalists. It is believed the project is at last in shape for a forward movement. The low silicon iron of the Tennessee Co., now used at the Birmingham Rolling Mill Co.'s steel plant, the only one in operation in the South, will be the chief raw material of the new basic works, and it should give an exceedingly low cost for steel at tidewater. There is little question of the building up of a large export trade in Birmingham steel.

It is stated that the subscribers to the $1,000,000 steel plant bonds receive a bonus on their subscriptions of 40 per cent in preferred stock. The Tennessee company takes the 60 per cent left and underwrites the whole transaction, guaranteeing 6 per cent on the investment. It agrees to supply the iron necessary at a price approximating cost during the life of the bonds. The fuel gas from the adjoining by-product coking plant is also obtained at a special rate. The advantage to the Tennessee company is a steady and certain market for a part of its product, and relieves the pig iron market of the handicap of surplus stock seeking buyers. The papers are in the hands of the attorneys, who are arranging details in legal form.

The Fraser and Chalmers Co.

The outstanding bonded indebtedness of the Fraser & Chalmers Co., Ltd., whose properties in England and the United States are controlled by an English corporation, is to be increased from £250,000 to £350,000. The bonds now outstanding mature in 1900 and are at 6 per cent. It is proposed to make the new rate 5 per cent. At the recent annual meeting in London the chairman stated that the American business still leaves much to be desired. There has been no lack of orders, but competition has been very keen, and the company has labored under special difficulties in consequence of its factories being about two miles apart. The plan is to bring all the workshops under one roof before long, and it is partly with this object that it is proposed to raise new capital. The British engineer's strike of the last year is also

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answerable in a measure for conditions being somewhat less satisfactory than in the preceding year. During the six months the labor troubles lasted the output of the company was reduced to about one-third of what it was normally. The only notable change in the balance sheet is a large increase in the stocks of merchandise in course of construction and in hand. This is being rapidly worked off now. The directors recommend the payment of a dividend of 5 per cent, which they say has been fairly earned. Very full allowances have been made for depreciation, and many bad accounts on the books, both in the United States and England, have been written off. The directors say they look with confidence to the future. There is now six months' work in hand, and fresh orders are coming in every day.

The End of an Expensive Rolling Mill Plant.

The closing down of the Pacific Rolling Mill & Forge at Potrero, San Francisco, is referred to by San Francisco papers as likely to be permanent. It would appear that the equipment of the plant, very costly to begin with, has not been kept up to the competing standard of efficiency. Two sets of mortgagse are out. The first bear interest at the rate of 6 per cent and aggregate $213,000. There are also outstanding $500,000 worth of second mortgage bonds with interest at 5 per cent. The principal holder of the coupons is the Fair estate, which carries $70,000 worth. D. O. Mills is also a creditor to a considerable amount. These, with other bondholders and other creditors, have claims against the Pacific Rolling Mills aggrgeating $800,000. The principal stockholder in the concern is the Fair estate, with 100,000 shares. President Charles Neal attributes the closing of the mills to Eastern competition, high wages and a high price for fuel in San Francisco. It was thought not long ago that the Scotts would purchase the place and add it to their ship-building plant, but this was not done. Since the building of the Charleston no work to speak of has been done in the mills for the Government vessels.

CHARLES H. CRAMP, head of the William Cramp & Sons Ship & Engine Building Co., of Philadelphia, denied that there is any truth in the reported consolidation of the Cramps Co. and Vickers, Sons & Maxim, of Barrow in Furness, Eng., into one ship-building concern. Mr. Cramp said: "There is absolutely nothing in it, and such a move as mentioned has never been contemplated." Mr. Cramp also denied the report that the company will build a ship yard at Port Arthur for Russia.

IT is reported that another American steelmaker (not Carnegie) has offered to supply steel ship plates on the Clyde at 5s. per ton under the price of those of Scotch make. The Scotch steel trade is very busy, and more than one firm has ceased to quote unless the buyer is prepared to pay considerably over current prices. The first consignment of American steel ship plates to be offered at the new rates is expected to arrive in the Clyde next week.—[London exchange.

ILLINOIS Steel Co. stock had a lively advance May 26. From a close of 50¾ the night before the stock went up to 54 on that day. The increased earnings of the company are said to be responsible for the advance.

RECOMMENDATION has been made in the Navy Department that contracts be awarded for supplying the armor for the three battleships under construction, as follows: To the Carnegie Steel Co., Ltd., 1,153 tons for the Illinois and 2,558 tons for the Wisconsin; Bethlehem Iron Co., 1,045 tons for the Illinois and 2,558 tons for the Alabama, all at $400 a ton.

OKURA & Co., of Japan, importers, wish to secure catalogues of manufacturers and dealers in iron, steel, machinery and railway appliances. Mail should be sent to Mr. C. Kadono, the representative of the firm, whose present address is care of C. v. Pustau & Co., 134 Pearl st., New York.

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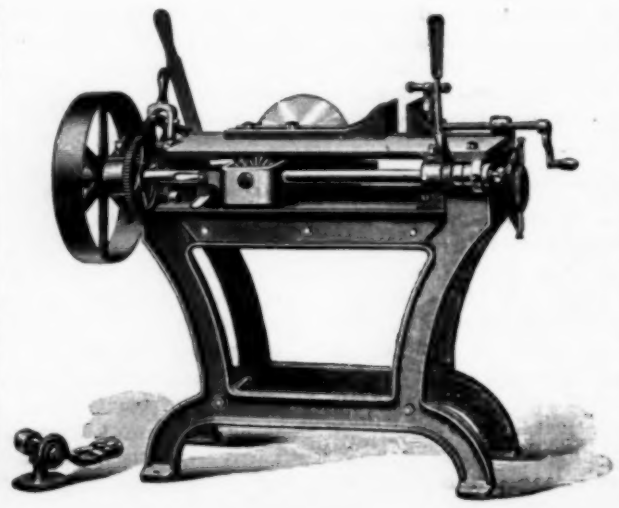

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

Orrin Hoxie and Charles H. Clark, of Rochester, N. Y., have formed a co-partnership for the purpose of building light machinery and for the manufacture of metal specialties and all kinds of brass, steel and experimental work, under the firm name of Hoxie & Clark, with factory and offices at 42 and 44 Stone street.

The Tecumseh Malleable Iron Co. has been incorporated at Tecumseh, Mich., with capital of $25,000.

Leroy Willey, Mount Upton, N. Y., will purchase a good second-hand 2-h. p. gasoline engine for his new machine shop and foundry, which are now about completed. A 15-h. p. engine and a 40-h. p. boiler will also be installed.

The city of Cleveland has advertised anew for proposals for its cast iron pipe supply for the coming year. Bids will be opened June 13.

Bids are asked by the Stark county commissioners until June 6, for constructing a bridge 110 ft. long and 18 ft. wide over the Mahoning River, at Alliance, O. The former bids have been rejected, according to reports.

The Vulcan Iron Co., Ltd., of New Castle, has purchased the Glover foundry plant in that city, and intends improving the plant. A 15-ton crane will be installed, also a hoisting machine for charging purposes.

Bids are wanted until June 4 for a bridge superstructure over the Mahoning River at Leavittsburg. The length of bridge will be 150 feet, roadway 16 feet wide. Chas. B. Selby, Warren, O., is auditor.

The Patton Mfg. Co., of Columbus, O., has been incorporated, with a capital of $25,000, to deal in hollow ware and other castings of aluminum. The incorporators are A. G. Patton, L. L. Rankin, N. B. Abbott, Thomas E. Knauss and M. G. Patton.

At Waukegan, Ill., Chas. Kressin has started a brass foundry.

G. W. Chance & Co., 14 South Broad st., Philadelphia, Pa., are in the market for bolt-making machine for bolts up to 12 inches long.

The Star Bucket Pump Co., 115 South Main st., St. Louis, Mo., will buy machinery for working wood, sheet metal and wire.

The Greer Machinery Co., Knoxville, Tenn., is in the market for a No. 5 Gates crusher, second-hand.

New Construction:—

The new building which the Waterville Cutlery Co. is erecting at Waterville, Conn., will have a steel roof which is being built by the Berlin Iron Bridge Co. The trusses are steel, and the covering is corrugated iron lined with the Berlin Co.'s patent anti-condensation fireproof lining. The building is 21 feet wide and about 100 feet long, and is to be used as a forge shop in one end, and in the other end will be located the boilers and engines.

A large foundry is being built at the plant of the United States Heater Co., New York.

The Bissell Chilled Plow Co. has erected a new building on the site of the one recently burned.

The roll foundry to be established at New Kensington, Pa., by W. A. Cochran, of Leechburg, will be 90 feet wide by 200 feet long, with two 25-ton electric traveling cranes and two air furnaces. Both sand and chilled rolls will be manufactured.

At Arthur, Ill., a building 35x132 is being erected for the Monroe Road Machine Co., an industry recently located by the business men's association of the place.

The new Dresden (O.) Iron & Steel Sheet Co. has let contracts for the erection of its plant. Work will be finished Sept. 1. At the beginning 80 men will be employed. A galvanizing plant will probably be built later.

Additions, Enlargements, Removals, Etc.:—

The Springfield Machine Tool Co., Springfield, O., has begun work on a new machine shop, 60 x 200 feet, the addition being necessitated by an increasing business. The company is three months behind orders.

The Walker Co., Cleveland, by roofing over the space between two buildings, is securing additional assembling and machine shop room for the gun carriage work it now has on hand.

The Johnston Harvester Co., Batavia, N. Y., is arranging for extensive additions to its large plant. The cost of new buildings and machinery will be $25,000.

The Monessen plant of the National Tin Plate Co, is to be increased from a six-mill to a 14-mill plant. This decision was reached at a meeting held in Anderson, Ind., a few days ago. When these improvements are completed it will make

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Machine Tools and Supplies. Send for list of Second-hand Tools.

Improved Multiple Punch and Gate Shear.

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PLATE STRAIGHTENING ROLLS especially designed for ROLLING MILL SERVICE.

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this concern rank second in size in the manufacture of tin plate.

Zitterell Bros. will erect a new foundry adjoining the old plant of Barnes Bros., at Maquoketa, Ia., having taken a five years' lease of the works.

Extensive additions and alterations are being planned at the foundry of Godfrey Rebmann & Co., 13th and Noble sts., Philadelphia.

A press dispatch says that the Lehigh Zinc & Iron Co., South Bethlehem, Pa., with plants at other points, will concentrate its works at Lehigh Gap, Lehigh Co., Pa., where it has purchased 100 acres of land.

The Chicago Hardware Co.'s foundry at North Chicago, has been enlarged, adding one-third to its capacity.

Fires and Accidents:—

At Rich Hill, Mo., the J. H. Cook wagon and plow works were destroyed by fire.

A gasoline explosion in the chemical laboratory of the American Steel Foundry Co., at Granite City, Ill., May 24, set fire to the plant and a loss of $15,000 resulted. Chas. Kuhns, the chemist, was severely burned.

At Dayton, O., a fire involving several establishments, caused a loss of $5,000 to Van Horne, Burger & Co., manufacturers of gas engines; $500 to the Dayton Machine & Tool Works; $500 to the Metcalf Machine Works; $4,000 to the Dayton Plating Works.

The machine shop and round house of the Au Sable & Northwestern Railroad Co., at McKinley, Mich.. burned May 26; loss, $50,000.

The Madison Foundry, Madison, Wis., owned by Theo. Kupfer, sustained a $2,000 loss by fire.

The foundry of W. E. Winston, at Nacogdoches, Tex., burned May 20.

General Industrial Notes:—

The Mansfield Machine Co., Mansfield, O., reports business very good. It is now finishing coal mine haulage engines and boilers for the Webster Gas & Coal Co., Webster, Pa., and the East Goshen Coal Co. New Philadelphia, O., and has a contract for a similar outfit for the Cambridge Coal Co., Cambridge, O. The company has also closed a contract with the Sonnhalter Coal Co., Massillon, O., for a coal mine hoisting engine, together with boiler.

Worth Brothers, Coatesville, Pa., have placed an order with the S. R. Smythe Co., engineers and contractors, of Pittsburg, for the building of a 40-ton basic open-hearth steel furnace.

The Otto Gas Engine Works, John Saltar, Jr., manager, has removed its office and warehouse from 245 Lake st. to 360 Dearborn st., Chicago.

The Chambersburg Engineering Co., Chambersburg, Pa., has just made a large shipment of hydraulic punch riveters and cranes to the Shoen Pressed Steel Co., Pittsburg, and has under construction for the same house a 100-inch hydraulic riveter. The company is also just about finishing five large engines of a new design frame.

The Russell Wheel & Foundry Co., Detroit, has shipped since Jan. 1 more than 400 logging cars of from 30,000 to 50,000 lbs. capacity to various States and Territories. A large number of contractors' cars, of from 1½ to 5 yds. capacity, have been built, some being equipped with air-brakes, M. C. B. couplers, steel trucks, etc.

The Vulcan Iron Works Co., Toledo, O., has contracts for three 70-ton Giant steam shovels of all-steel construction, the rated capacity of each being 4,500 tons of iron ore in 10 hours. The business of steam shovel companies has been increasing of late.

The three Cornwall furnaces at Lebanon, Pa., have been banked as the result of the recent strike among the men.

The Eagle mill at Ironton, O., reports only a moderate demand. The mill may probably be idle throughout July, and is preparing to put in a new three-high muck train to replace the old one, and an additional engine now on the ground.

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Angles, Channels and Special Shapes for Car, Carriage and Wagon Work.

Iron and Steel Car Axles and Forgings.

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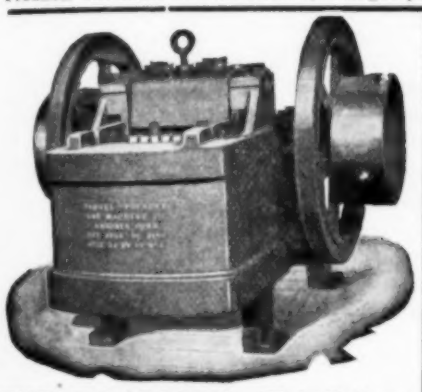
Regenerative Gas Furnaces and Water Seal Gas Producers.

Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.



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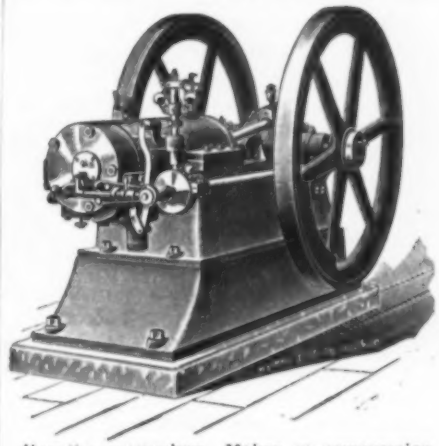
If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

The Brown GAS AND GASOLINE Engine.



Uses Gas or Gasoline. Makes no compression while engine is running idle. Charges fired with electric spark tube igniter. Made upon honor and fully guaranteed. Write for description and prices.

Columbus Machine Co.,

COLUMBUS, O.

The latest Government contract for projectlies has been awarded to the Firth-Sterling Steel Co., of Pittsburg; the Carpenter Steel Co., of Reading, and the Midvale Steel Co., of Philadelphia. The order is for armor-piercing shot and shell, the projectiles ranging in size from eight to 12 inches, and the shells to be of the 12-inch variety, each to weigh between 800 and 1,000 pounds. Altogether 6,000 are wanted. The entire contract amounts to about $1,200,000, of which one-third goes to the Firth-Sterling Co., of Pittsburg.

The McMurray Foundry received an order for 1,700 7-inch projectiles to be delivered to the Watervliet Arsenal.

We are informed by D. H. Smalley & Co., Aurora, Ill., makers of shearing and punching machines and special machinery, whose plant was totally destroyed by fire May 13, that they are making arrangements to rebuild immediately, and will replace the machinery and tools in their shops, which were destroyed by the fire, with new equipment. It will take about two months to rebuild and put the plant in as good shape as it was before the fire. In the interim, Smalley & Co. are filling orders from agencies and are having their tools made at neighboring shops. All the products of this company have been having a steady and increasing sale and have become popular with jobbers and consumers. At the time of the fire, the concern was behind on orders on many of the tools it manufactures.

The contract for furnishing at Bennett, Pa., 1,300 feet of cast iron water pipe has been awarded to the National Foundry & Pipe Works, of Scottdale, at $16 per ton.

A Boston special to the *Wall Street Journal* says: "The five point rise in Illinois Steel Co., May 26, was probably due to the election of Robert Bacon, of J. P. Morgan & Co., to the board of directors. Mr. Bacon succeeds F. L. Higginson, who has resigned from the company owing to his contemplated absence abroad for a year. The Illinois Steel Co. is in a very strong position. It has been doing a business greatly in excess of last year, and has a good business assured for a year ahead. The largest part of the company's business is in steel rails, and there is but little probability of rail orders being cancelled, on account of the general prosperity of the railroad companies. The company's collections are good, and it is gradually reducing its bills payable."

The Schenectady Locomotive Works, Schenectady, N. Y., has received orders, according to report, for 38 locomotives for Japan, of which 26 are of the mogul type, weighing 82,000 lbs. each, for the Nippon Railway, and the remainder are of the consolidation type, for the Kiu-Siu Railway, and will weigh 94,000 lbs. each.

At the annual meeting of the William Cramp & Sons Ship & Engine Building Co., at Philadelphia, the report for the year ending April 30 shows between 5 and 6 per cent earned on the stock. The total gross business was $3,892,872, but orders on hand aggregate more than $10,000,000.

There was another outbreak at Scottdale, Pa., of the old trouble between the present employes of the Scottdale Iron & Steel Co. and the locked out union men. Several men were injured in the collision, for which both sides are charged with being responsible.

Furnace No. 2, of the Watts Syndicate, at Middlesborough, Ky., is about ready to blow in and will be started early in June. The steel plant, too, is being put in shape for operation.

The Croxton Furnace of the Penn Iron & Coal Co., Canal Dover, O., went out on the 24th inst., after a run of nearly three years, for relining and a new bosh. The repairs will require six or seven weeks.

The employes of the Union Car Works, at Depew, N. Y., are striking for an increase in wages.

The Q & C Co., of Chicago, has just sold two dozen shop saws in Paris. Last week it shipped to Montreal one of its fine X saws, and another of the same size to Sheffield, Eng.

The Consolidated Steel & Wire Co. took judgment for $6,662 at New York against John T. Kirby, export broker.

The Hazen nail mill, at Anderson, Ind., idle for several years, is to be put in operation. R. L. Kane, representing Eastern capital, is to take charge. A wire drawing department will be added.

Important improvements have been started this week at the South mill of the Lackawanna Iron & Steel Co., at Scranton, Pa.

The Advance Mfg. Co., Hamilton, O., contemplates adding other lines to the present one which consists of gas and gasoline engines. Larger quarters are under negotiation.

Machinery for work on Government contracts at the Driggs-Seabury Gun & Ammunition Co., Derby, Conn., is arriving daily. An electrical crane, weighing 10 tons, from the Shaw Electric Crane Co., is being put into Factory No. 2. Electrical motors of 30 h. p., from the Westinghouse Co., are also being put in, and a big generator is being made at Turtle Creek, Pa. A night shift of 100 men has been put on the Government orders. Factory No. 3, which is being built to meet the demand, is progressing rapidly.

The rod department of the Illinois Steel Co. has resumed operations last week, giving employment to 200 men. It had been idle for two months for repairs.

On the water pipe contract for New London, Conn., bids were made as follows: Chattanooga Foundry & Pipe Works, $17.20; Warren Foundry & Machine Co., $16.20; Fox & Engel, $17.20; M. J. Drummond & Co., $16.50; R. D. Wood & Co., $16.25.

A special finding for the defendants has been made by a jury at Greenfield, Ind., in the suit of Receiver McGettigan, of the Premier Steel Works, against stockholders for payments on stock amounting to $855,000.

The Richmond Locomotive & Machine Works has just received by cable an order from the Finland (Russian) State Railway for 17 compound locomotives.

The Committee on Ways and Means has favorably reported, with amendments, in the House, the bill introduced by Mr. Olmstead, of Pennsylvania, providing for the rebate of duty paid on the importation of iron ore (chiefly from Cuba) used in the manufacture of steel rails, when they shall be exported.

THE Swarts Metal Refining Co., 20 North Desplaines st., Chicago, recently sold 100,000 lbs. of pig lead to the Illinois State Arsenal for use in making ammunition. The company also reports the receipt of a large order for its XXX genuine babbitt metal from Mexico. Business has been very good with the Swarts company for some time past, necessitating its running nights and days, full time.

J. B. DOAN & Co., 68 and 70 S. Canal st., Chicago, representing the American Tool Works Co., of Cincinnati, and other makers of iron working tools, have rented the store at 65 S. Canal st., in addition to the present store. Doan & Co. keep on hand a large stock of new and second-hand tools at all times. The increase in their business necessitated the additional store room.

THE rebuilding of Eliza Furnace No. 2 of Laughlin & Co., Pittsburg, will be done by the Riter-Conley Co., the Pittsburg engineers. The new stack will be 100 feet high and 22 feet in diameter and the specifications call for completion of the steel frame in 30 days. The contract includes the erection of a new store, 103 x 21 feet.

AT least two of the lake ship-building concerns have been in correspondence during the past week with Atlantic coast ship owners who contemplate placing orders for new vessels, but who have found that the coast yards are so crowded with work that it will be impossible to secure delivery from them until late nxet year. The vessels under consideration are large freight carriers and the plan of the lake builders is to cut them in two for passage through the Canadian canals.—[Marine Review.

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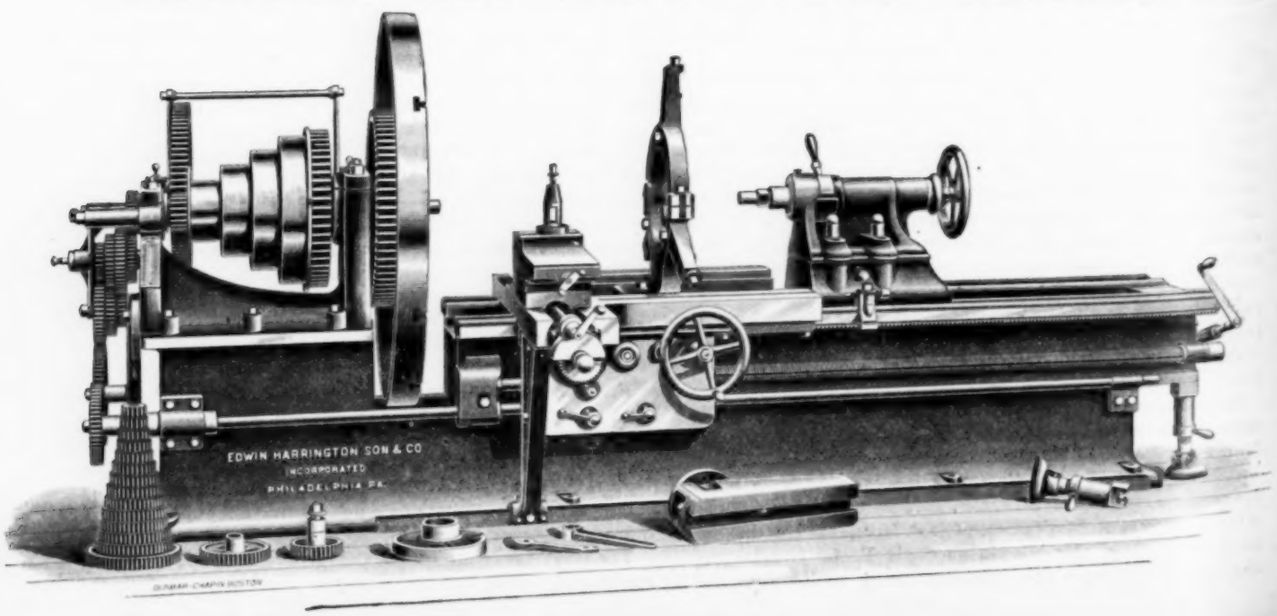
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